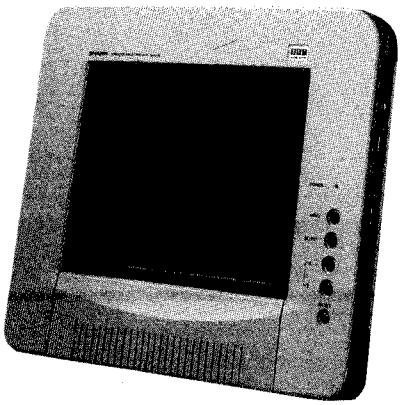
SHARP SERVICE MANUAL

S3320QA-1650/



COMPUTER PROJECTION PANEL

MODEL QA-1650

In the intersets of user-safety (Required by safety regulation in some countries), the set should be restored to its original condition and only parts identical to those specified should be used.

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SHARP CORPORATION

INTRODUCTION

COMPUTER PROJECTION PANEL displays images generated on a personal computer onto a large screen or wall,using an overhead projector(OHP) as a light source.

QA-1650 can also accept PAL/NTSC/SECAM composite video signals and S-Video signal from VCR or etc.

QA-1650 has an analog RGB video output so that an external monitor can also be connected.

QA-1650 employs 10.4 inches TFT(Thin Film Transistor) 640×480 dots color liquid crystal display(LCD).

It is designed so that the heat generated by OHP is exhausted from the computer projection panel by a fan motor not to increase the temperture of LCD extremely.

Approximately DC 12V is supplied as a power source externally through AC adaptor.

A remote control unit with illumination key is equipped to control following functions.

1.Function to adjust picture quality.
2.Function to clear the screen
3.Function to enlarge the screen
4.Function to move a picture
5.Function to freeze a picture
6.Function to output the signal to computer through RS-232C

A serial communication terminal(conformable with RS-232C) is equipped with QA-1650 to send a signal to a computer.

IBM PS/2 PC/XT/AT(VGA, MCGA, EGA, CGA, MDA, Hercules/+/Incolor), APPLE MAC Ⅱ series AT&T(6300WGS, PC6386WGS, PC6312WGS, PC6286WGS) are compatible with QA-1650.

SPECIFICATION

1.SPECIFICATIONS OF MAIN BODY

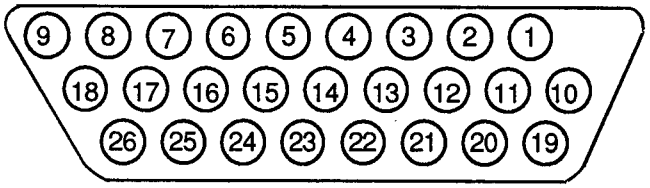
1.Display unit	:	10.4 inches TFT color LCD
2.Color	:	Approx. 16,000,000 colors
3.Character display area	:	Max about 211.2(W)× 158.4(H)mm
4.Dot arrangement	:	R,G,B vertical stripe
5.Number of pixels	:	640(W)×RGB×480(H)dots
6.Input video signal	:	TTL level - R,G,B,r,g,b,Hsync,Vsync
		R,G,B,I,Hsync,Vsync
		Video,I,Hsync,Vsync
		Analog level - VGA signal for IBM PS/2(0.7Vp-p)
		APPLE MAC Ⅱ video card signal(0.7Vp-p,1.0Vp-p)
		Composite - M/NTSC composite video signal(1.0Vp-p)
		B,G,H,I/PAL composite video signal(1.0Vp-p)
		B,G,H,D,K,L/SECAM composite video signal(1.0Vp-p)
		(Input impedance is 75Ω.)
7.Input/Output connectors	:	Composite video signal input connector(1)
		Conputer signal input connector(1)
		Monitor signal output connector(1)
		Serial output connector(1)
		DC power supply connector(1)
		S-terminal video signal input connector(1)
8.Switches	:	DC power ON/OFF switch(1)
		Front/rear projection switch(1)
		Function switches(5)
		PAL/SECAM select switch(1)
9.Functions	:	Picture information display function
		Horizontal and vertical image positioning,phase adjustment,
		frequency adjustment,contrast adjustment,composite video image
		adjustment
		Software reset function
		Remote control function
		PC control(serial interface port)
		Freeze function
		Enlarge function
		Image clear function
		Automatic video recognition function
		Adjustment memory function
10.Dimentions	:	380(W)×320(D)×60(H)mm(15.0(W)×12.6(D)×2.4(H)inches
11.Net weight	:	Approx. 3kg(6.7lbs) panel only
12.Others	:	Surface air-cooling function(using cooling fan motor)

2.SPECIFICATIONS OF INTERFACE

2.1.Video signal input selection

Input signal layout:

1.Digital Secondary Green(g,i)	14.Analog Green Return
2.Digital Secondary Blue(b,Video)	15.Analog Red Return
3.Digital Secondary Red(r)	16.Digital GND
4.Analog Blue	17.N.C.
5.Analog Green	18.N.C.
6.Analog Red	19.Vsync(Digital)
7.Digital GND	20.Hsync/Csync(Digital)
8.Test 1(MAC Ⅱ)	21.N.C.
9.Test 2(A/D)	22.N.C.
10.Digital Green	23.Digital GND
11.Digital Red	24.Digital GND
12.Digital Blue	25.Digital GND
13.Analog Blue Return	26.N.C.



Connector : Subminiature D26-Pin connector
AMP 748481-6(applicable plug housing is AMP 748365-1)
JST KAY-26S-2A3F14(applicable plug housing is JST KAC-26P)
or equivalent ones.

TEST 1 terminal : Must be set to LOW(GND) for analog APPLE MAC LC,MAC Ⅱ video card signal input and to open(N.C.) for other signal input.

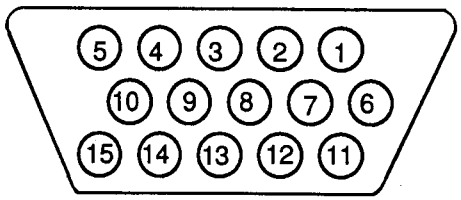
TEST 2 terminal : Must be set to LOW(GND) for analog video signal input and to open(N.C.) for digital video signal input.

It is impossible to use digital video signal input(1,2,3,10,11,12) and analog video signal input(4,5,6) simultaneously.

2.2.External monitor signal output selection

Signal layout:

1.Analog R(75Ω load)	9.N.C.
2.Analog G(75Ω load)	10.Digital GND,Shield
3.Analog B(75Ω load)	11.Digital GND
4.N.C.	12.N.C.
5.ANALOG GND	13.Hsync(Digital)
6.Analog R Return	14.Vsync(Digital)
7.Analog G Return	15.N.C.
8.Analog B Return	



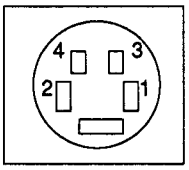
Output level: Input level± 10%(75Ω load)
Only analog RGB signal is outputted.
Connector : Subminiature D15-Pin connector
JST EKHEY-15S-1F3P14-143(applicable plug housing is JST KEC-156P)
or equivalent ones.

2.3.Composite video signal input selection

Pin jack(corresponded to EIAJ RC-6703A)

2.4.S-terminal video signal input selection

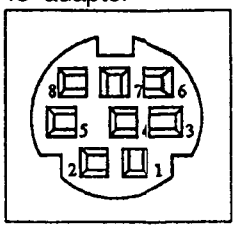
Signal layout : 1.GND 3.Y
2.GND 4.C



2.5.Power input selection

Input terminal : Center pin is "+" polarity
Input voltage : 12V DC(with main body under load),1.95A with supplied special AC adaptor

2.6.Serial Interface port selection



Signal layout :
1.Signal GND
2.Transmitted Data(OUTPUT)
3.Received Data(INPUT)
4.Request to Send(OUTPUT)
5.Clear to send(INPUT)
6.Data Set Ready(INPUT)
7.Signal GND
8.Data Terminal Ready(OUTPUT)

Signal level : Shall conform to the requirement of EIA-232-C standard.

3.SPECIFICATIONS OF ENVIRONMENT

Basically,these environmental specifications apply to the main body and its accessories.

Table 1

Item		Specification	Remark
Operating environment	Operating temperature	0 to 30℃ (The LCD surface temperature shall be 40℃ or lower.)	No dew condensation
	Operating humidity	Ta≦ 40℃ :90%RH Ta> 40℃ :Absolute humidity shall be less than Ta=40℃ 90%RH (Ta:Temperature of the LCD)	
Storaging environment	Storage temperature	-20 to 60℃	
	Storage humidity	Same as the operating humidity condition	

ADJUSTMENT OF P.W.B.

The QA-1650 has four P.W.B.'s, power supply ,control(main and video) ,and switch. The following paragraphs describe how to adjust these P.W.B.'s. Correct adjustments are essential for the unit to operate properly. When repair or service is carried out on parts of these P.W.B.s, they should be readjusted.
Adjustment methods are explained below. Be sure to check that the power supply has been adjusted before making adjustments to the control P.W.B.

1.ADJUSTMENT OF THE POWER SUPPLY P.W.B.

There are four adjustment points on this P.W.B., VRs 300, 301, 302,and 304 which are used for adjustments of V_{CPU}, V_{LCD}, 10V power supply, and A-Vcc respectively.

1.1.Adjustments of V_{CPU}, V_{LCD}, 10 V,and A-Vcc

1. Connect the AC adaptor connector plug to CN1.
   Check that the output of AC adaptor is approx. 12 V.
2. Connect the + lead of DC voltmeter to TP207, and the − lead to the power switch fixing angle for voltage measurement.
3. Before turning the power SW on, be sure to:
   Connect CN200 with fan motor.
   Disconnect the flexible cables from CNs 4, 5, and 12 to separate them from the LCD unit.
   Check if a conductor is crushed under the P.W.B. or if there is any foreign matter mixed.
   (Presence and type of video signals input to CN3 are not specified.)
4. Turn the power SW ON and check that the LED lights up and the fan starts.
5. Turn VR301 with slotted screwdriver and adjust to 5.0±0.05 V while checking the voltage on the voltmeter.
6. Turn the power SW OFF and connect the + lead of the DC voltmeter to TP206, turn VR300 with slotted screwdriver and adjust to 5.1±0.05 V while checking the voltage on the voltmeter.
7. Connect the + lead of the DC voltmeter to TP204, turn VR302 with slotted screwdriver and adjust to 10 ± 0.05 V while checking the voltage on the voltmeter.
8. Connect the + lead of the DC voltmeter to TP210, turn VR304 with slotted screwdriver and adjust to 5.0 ± 0.05 V while checking the voltage on the voltmeter.
9. Connect the + lead of the DC voltmeter to TP205 and check that the voltage is -9.9±0.5 V.
10. Check that the voltage at both ends of CN200 is (AC adaptor output voltage − 2 V)~(AC adaptor output voltage).

2.ADJUSTMENT OF CONTROL P.W.B.

This P.W.B. has 20 adjustment points, 6 of which are related to computer signals and 14 of which are for composite video signals that are explained in the following section. When repair or service is carried out to parts on these P.W.B.s, they should be readjusted.
Adjustment methods are explained below.Be sure to check that the power supply has been adjusted before making adjustments to the control P.W.B.

2.1.Adjustment of the DC offset in the analog RGB input signal AMP circuit

1. Turn the power SW OFF and connect the + terminal of DC voltmeter to TP9 and the − terminal to TP7.
2. Input a video signal to CN3 according to the timing of test pattern2.(See Fig.1)

2.2.Adjustment of the gain in the analog RGB input signal AMP circuit

1. Turn the power SW OFF and connect the TP4 and TP8 to a oscilloscope.(Connect TP7 to GND.)
2. Turn the power SW ON and input a video signal to CN3 according to the timing of test pattern3.(See Fig.1-C)
   Turn VR1 to settle the TP4 to the same voltage as TP8 with a slotted screwdriver while checking on the oscilloscope.
3. Turn the power SW OFF and change connection of the probe from TP4 to TP5.(Connect TP7 to GND.)
4. Turn the power SW ON and input a video signal to CN3 according to the timing of test pattern3.(See Fig.1-C)
   Turn VR2 to settle the TP5 to the same voltage as TP8 with a slotted screwdriver while checking on the oscilloscope.
5. Turn the power SW OFF and change connection of the probe from TP5 to TP6.(Connect TP7 to GND.)
6. Turn the power SW ON and input a video signal to CN3 according to the timing of test pattern3.(See Fig.1-C)
   Turn VR3 to settle the TP6 to the same voltage as TP8 with a slotted screwdriver while checking on the oscilloscope.

2.3.Adjustment of VCO

1. Connect the + terminal of DC voltmeter to TP19 and the − terminal to GND(power SW fixing angle).
2. Input a video signal to CN3 according to the timing of the test pattern 1.(See Fig.1-A)
3. Turn the power SW ON and operate unit for three minutes.
   Adjust L3 by using a ceramic driver and set the voltage at TP19 to 2.5±0.05V.(*)
4. Input a video signal to CN3 according to the timing of the test pattern 3.(See Fig.1-C)
5. Adjust L4 by using a ceramic driver and set the voltage at TP19 to 4.4±0.05V.(*)

(*)Voltage of TP19 may vary between when the adjustment driver is in contact with the variable core and when it is away depending on the material of adjusting driver to be used. Adjust the voltage to normal when it is away from the core.

2.4.Check of external monitor output

1. Turn the power SW OFF and connect the pins (between 1 and 6 ,2 and 7 ,3 and 8) of CN10 with 75Ω.
2. Connect the pins (between 1 and 6) of CN10 to a oscilloscope.(Connect pin-6 to GND.)
3. Turn the power SW ON and input a video signal to CN10 according to the timing of test pattern3.(See Fig.1-C) Check the voltage at 0.7±0.05Vp-p.
4. Connect the pins (between 2 and 7) of CN10 to a oscilloscope.(Connect pin-7 to GND.)
5. Turn the power SW ON and input a video signal to CN10 according to the timing of test pattern3.(See Fig.1-C) Check the voltage at 0.7±0.05Vp-p.
6. Connect the pins (between 3 and 8) of CN10 to a oscilloscope.(Connect pin-8 to GND.)
7. Turn the power SW ON and input a video signal to CN10 according to the timing of test pattern3.(See Fig.1-C) Check the voltage at 0.7±0.05Vp-p.

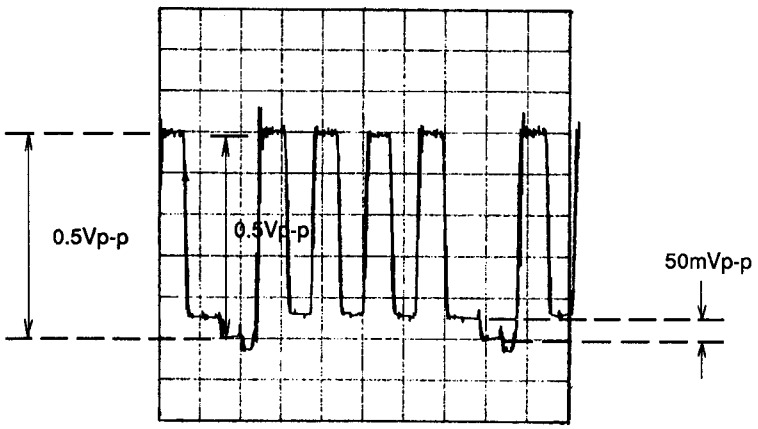
3.ADJUSTMENT OF VIDEO P.W.B.

3.1.Input composite video signal

1. Set the QA-1650 to composite video signal mode.
2. Input the timing of test pattern4 to CN400. Set the SW400 to PAL/NTSC mode.(left side)

3.2.Adjustment of BRIGHTNESS

1. Input the timing of test pattern4 to CN400.
2. Connect the oscilloscope to TP402.(The grounding lead of the probe shall be connected to the power switch fixing angle.)
3. Push the RESET key and turn VR7 with slotted screwdriver while observing the oscilloscope to make adjustments so that the waveform of TP402 becomes 50mVp-p as shown in the illustration below.

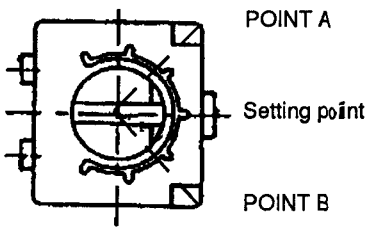


3.3.Adjustment of CONTRAST

1. Input the timing of test pattern4 to CN400.
2. Turn VR411 with slotted screwdriver while observing the oscilloscope to make adjustments so that the waveform of TP402 becomes 0.5 Vp-p as shown in the illustration above.

3.4.Adjustment of APC

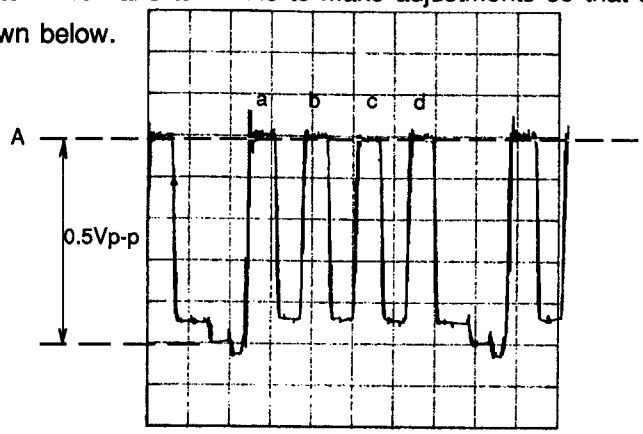
1. Input the timing of test pattern4 to CN400.
2. Turn VR416 to left terminal.
3. Turn power switch off.
4. Turn power switch on after several seconds.
5. Turn VR416 back to right slowly until the color appears.
6. Note the above setting position.
7. Turn VR416 to right terminal.
8. Turn power switch off.
9. Turn power switch on after several seconds.
10. Turn VR416 back to left slowly until the color appears.
11. Note the above setting position.



12. Set VR416 to the center between the settings determined in 6 and 11.
    If color already appears when position of VR416 is terminal(step 2 or 7),regard that position where color appears as terminal(s) of VR416.

3.5.Adjustment of TINT

1. Input the timing of the test pattern4 to CN400.
2. Push the RESET key to set TINT control to standard.
3. Connect the oscilloscope to TP402 and turn VR6 to make adjustments so that a, b, c, and d are just on the straight line A as shown below.

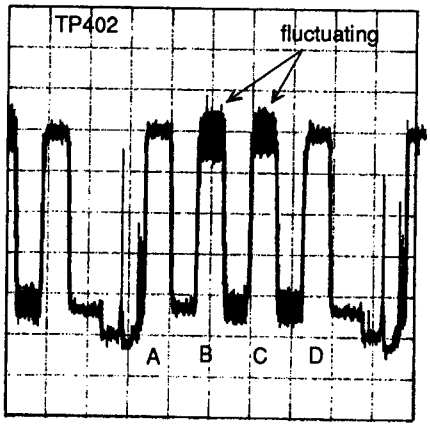


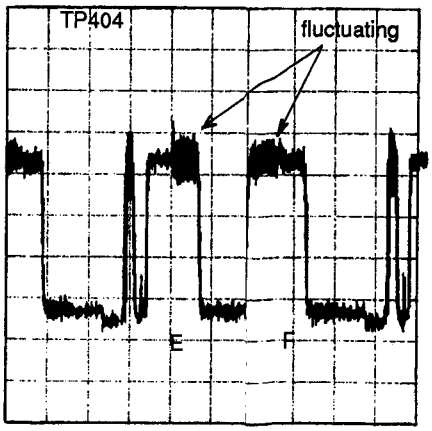
3.6.Adjustment of COLOR

1. Input the timing of test pattern4 to CN400. Push the RESET key and set COLOR control to standard.
2. Connect the oscilloscope to TP402 and turn VR5 to make adjustment so that the waveform becomes 0.5Vp-p as shown above.

3.7.Adjustment of APC(PAL)

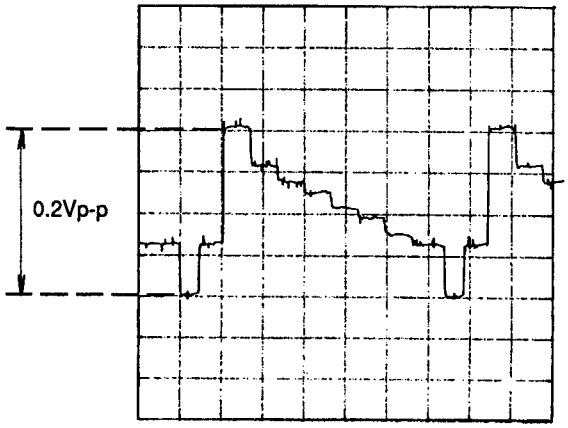
1. Input the timing of test pattern5 to CN400.
2. Connect A and B channel of the oscilloscope to TP402 and 404 respectively.
3. Turn VR415 with slotted screwdriver while observing the oscilloscope to make adjustments so that the peak and bottom of B to F shown in the illustration below do not fluctuate.





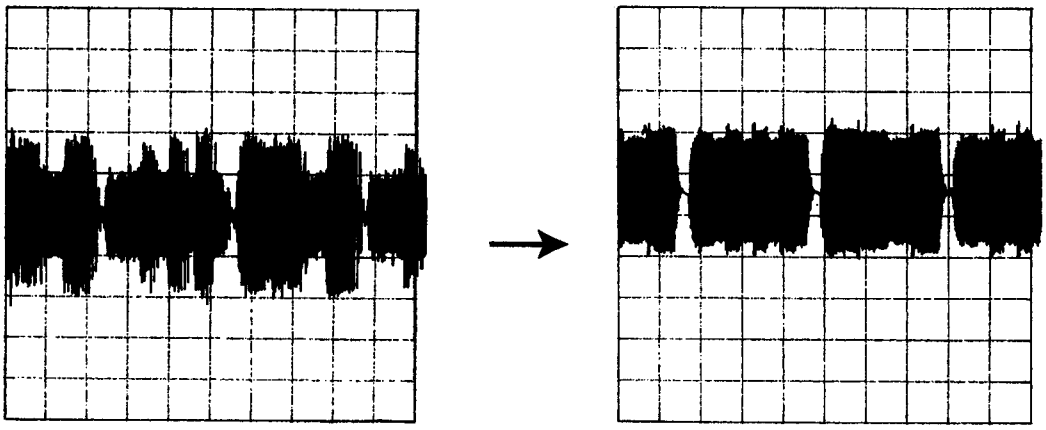
3.8.Adjustment of Y level(SECAM)

1. Set the SW400 to SECAM mode.(right side)
2. With test pattern6 inputted(See Fig.1-F), make adjustments with VR404 so that TP405 shows a waveform in which the difference between the peak and bottom is 0.2Vp-p.



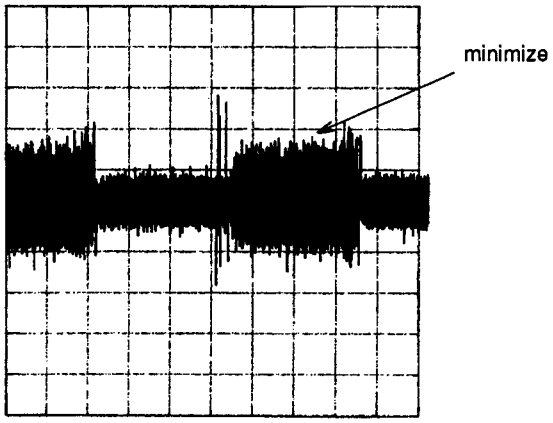
3.9.Adjustment of Bell Filter(SECAM)

1. Input the timing of test pattern 6.(See Fig.1-F)
2. Select SECAM (right side) with SW400.
3. Connect the oscilloscope to TP408.
4. Make adjustments with L400 so that TP408 shows a flat waveform shown below.



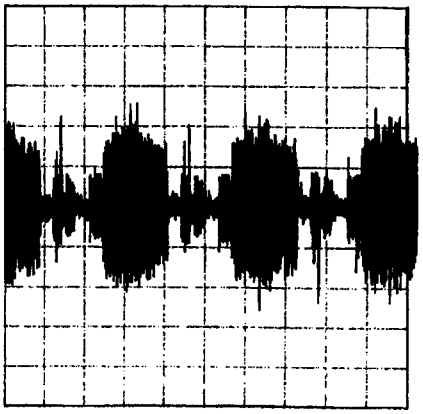
3.10.FM Detection(SECAM)

With test pattern8(See Fig1) inputted, make adjustments with L401 for R-Y and VR403 for B-Y so that the amplitude of R-Y and B-Y become to minimum.
(Repeat adjustments two or three times.)



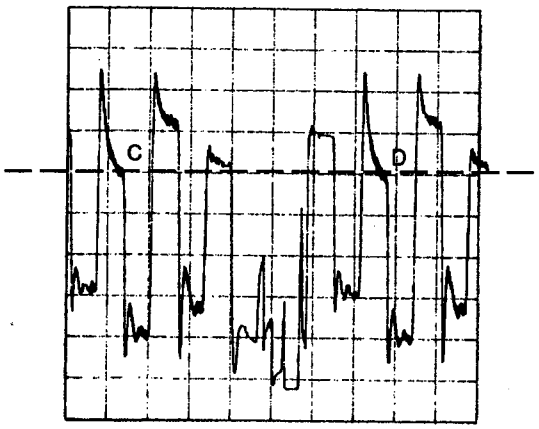
3.11.Adjustment of 1HDL(SECAM)

1. Input the timing of test pattern 6 to CN400.
2. Adjust VR405 so that 1H after and before signals are the same shape as each other.



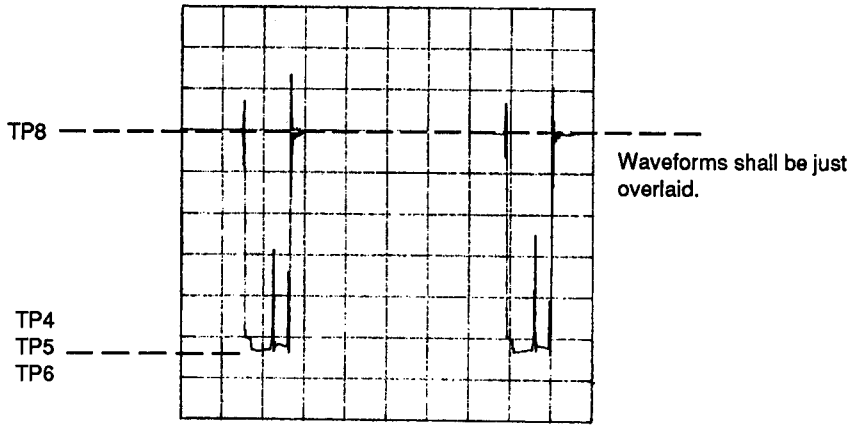
3.12.Adjustment of APC(SECAM)

1. Input the timing of test pattern 6 to CN400.
2. Turn VR420 to left terminal.
3. Turn power SW OFF.
4. Turn power SW ON after a few seconds.
5. Turn VR420 back to right slowly until the color appears.
6. Note the above setting position.
7. Turn VR420 to right terminal.
8. Turn power SW OFF.
9. Turn power SW ON after a few seconds.
10. Turn VR420 back to left slowly until the color appears.
11. Note the above setting position.
12. Adjust VR420 between point A and B so that C and D are the same level on TP402 as shown below.



3.13.Adjustments of Input Signal Gain

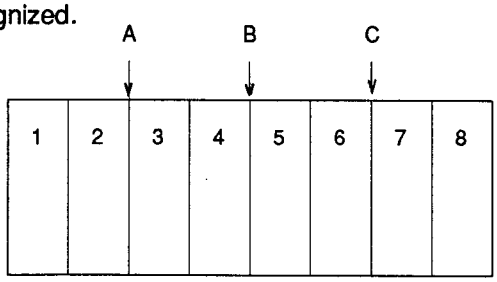
1. Input the timing of test pattern7 to CN400.
2. Push the RESET key to set CONTRAST control to standard.
3. Connect the oscilloscope with TPs 4 and 8 and make adjustments with VR414 so that they have the same peak level.
4. Shift the probe from TP4 to TP5 and make adjustments with VR413 so that TPs 5 and 8 have the same peak level.
5. Shift the probe from TP5 to TP6 and make adjustments with VR412 so that TPs 6 and 8 have the same peak level.



3.14.S signal picture

1. Input the timing of test pattern4(See Fig.1-D) to the S terminal(CN401).
2. Select PAL/NTSC (left side) with SW400.
3. Check if the color bar signal has dot interference or the like.(especially A, B, C)
4. Input the timing of test pattern5(See Fig.1-E) and check if the color bar signal has dot interference or the like.
5. Input the timing of test pattern 9(See Fig.1-I) to the S terminal(CN401).
6. Select SECAM mode (right side) with SW400.
7. Check that 3MHz line can be recognized.

1.white	2.yellow
3.cyan	4.green
5.magenta	6.red
7.blue	8.black



Color bar signal

TEST PATTERN 1(1/dot=14.318MHz)

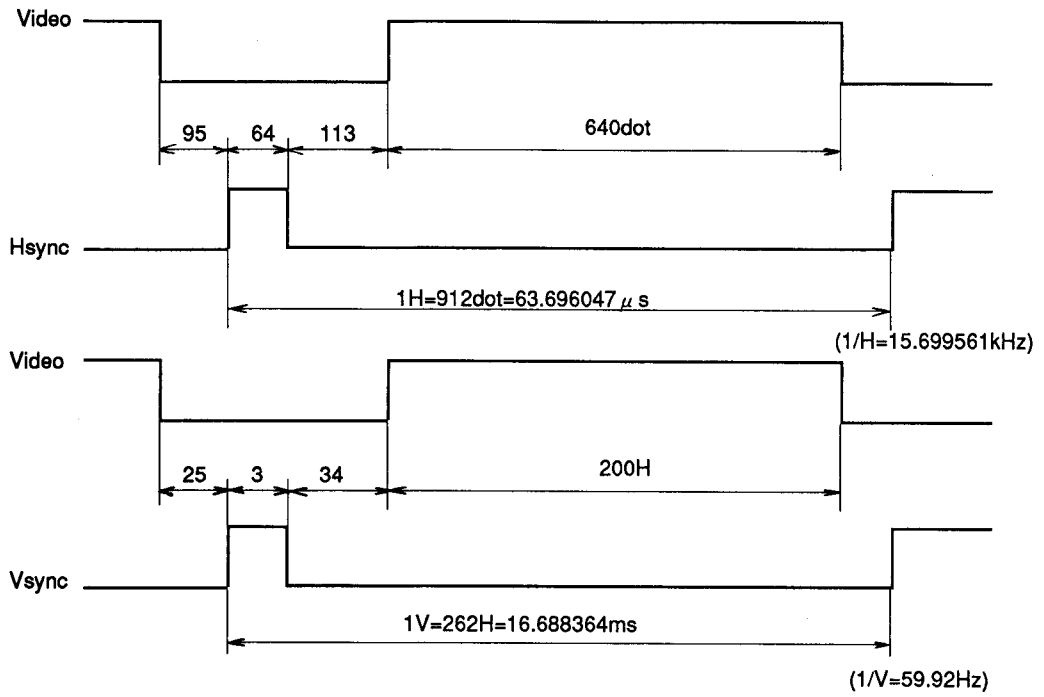


Fig.1-A

TEST PATTERN 2(1/dot=25.175MHz)

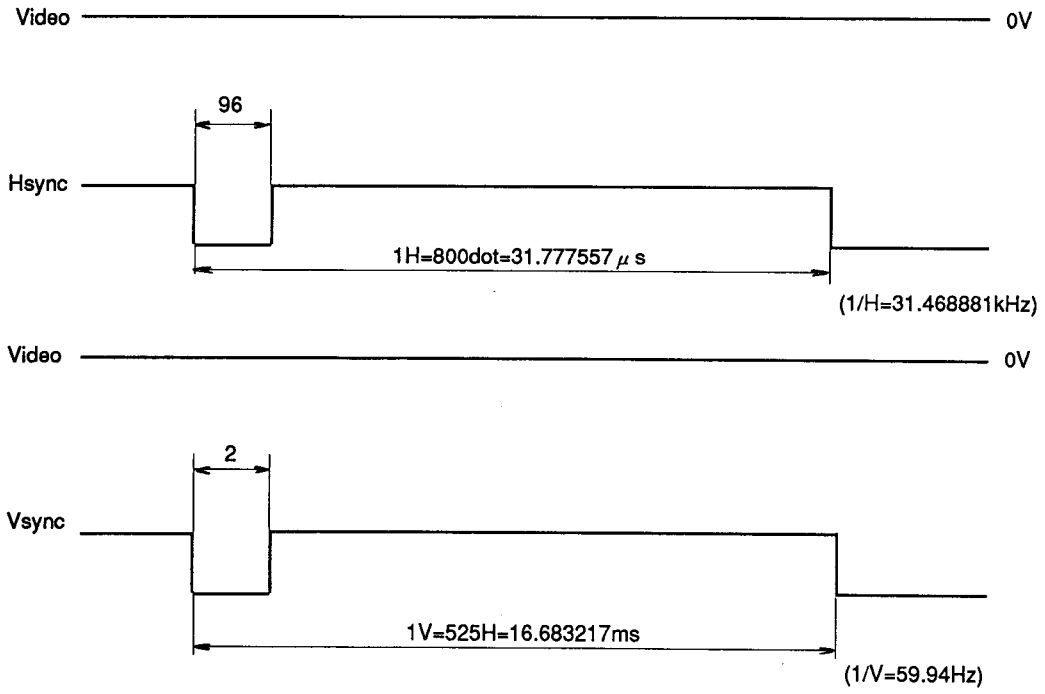


Fig.1-B

TEST PATTERN 3(1/dot=25.175MHz)

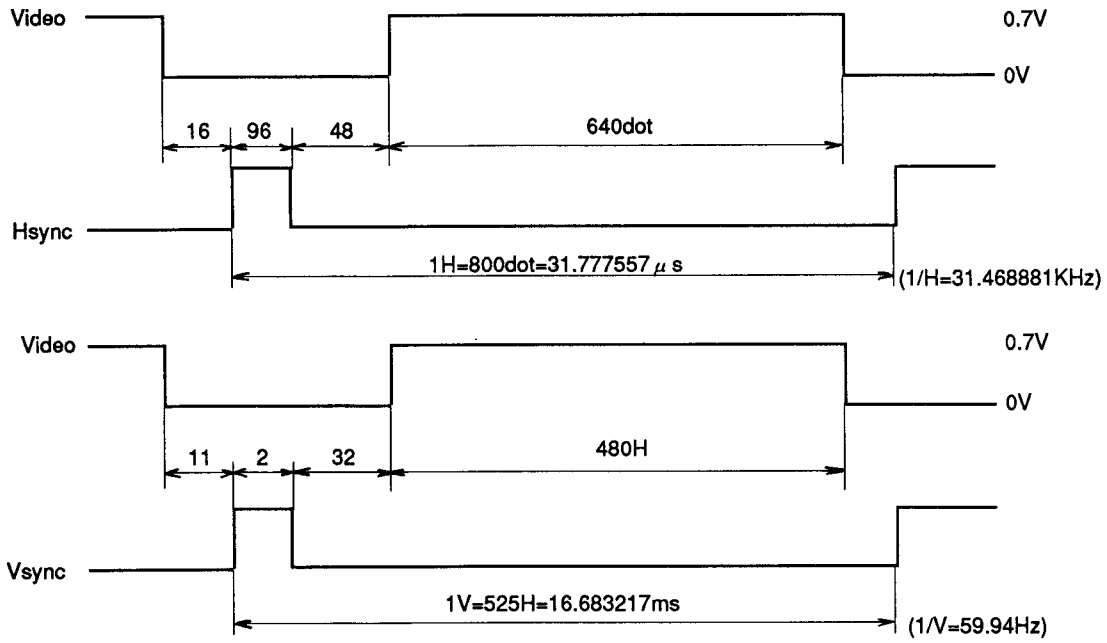


Fig.1-C

TEST PATTERN 4(NTSC 100% COLOR SIGNAL : Y-100%,C-100%)

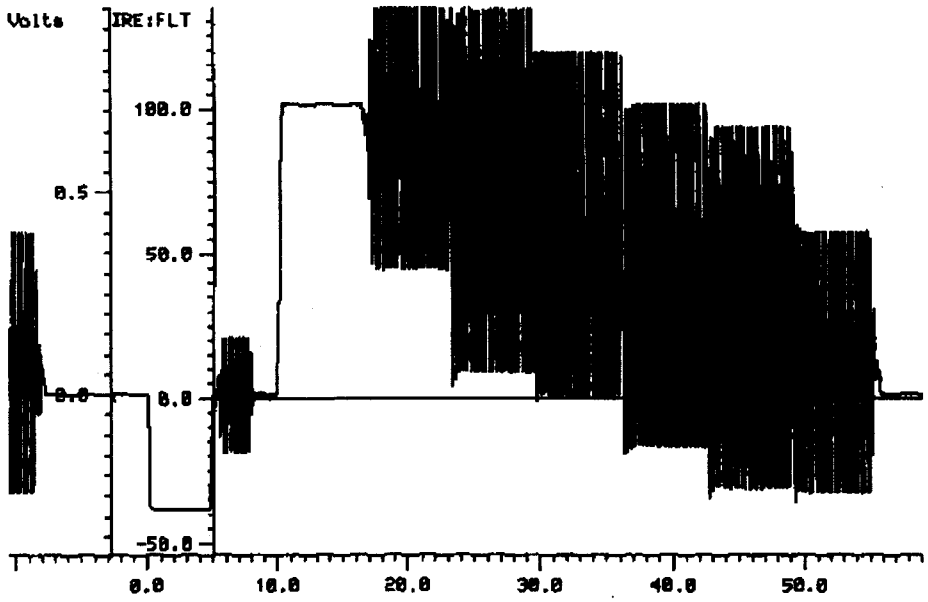


Fig.1-D

TEST PATTERN 5(PAL 100% COLOR SIGNAL : Y-100%,C-100%)

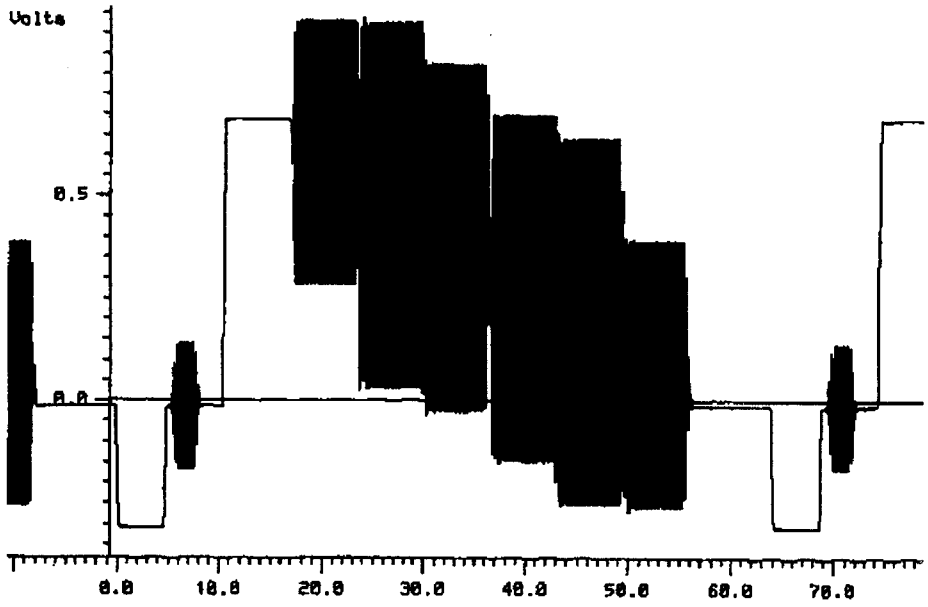


Fig.1-E

TEST PATTERN 6(SECAM 100% COLOR SIGNAL : Y-100%,C-100%)

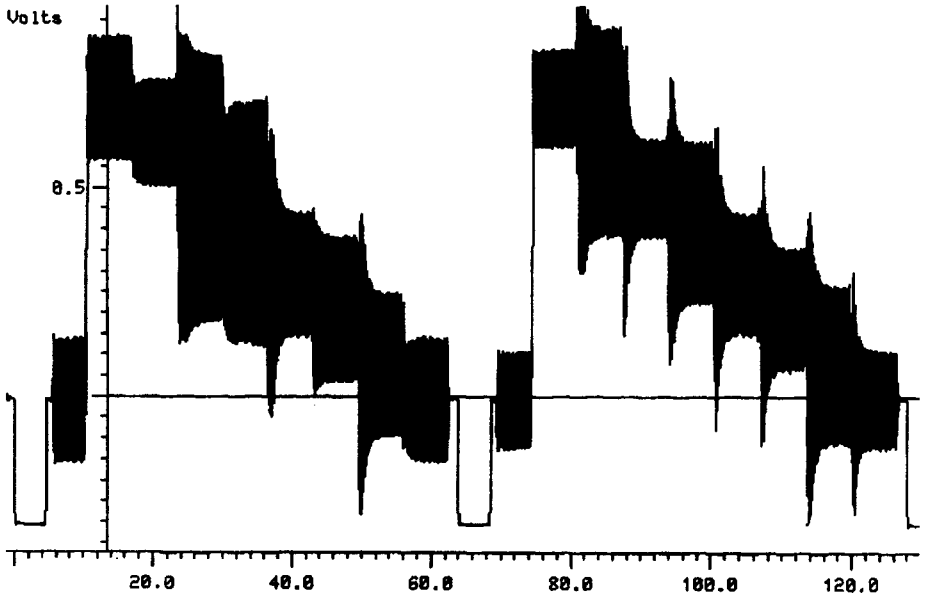


Fig.1-F

TEST PATTERN 7(NTSC 100% WHITE SIGNAL)

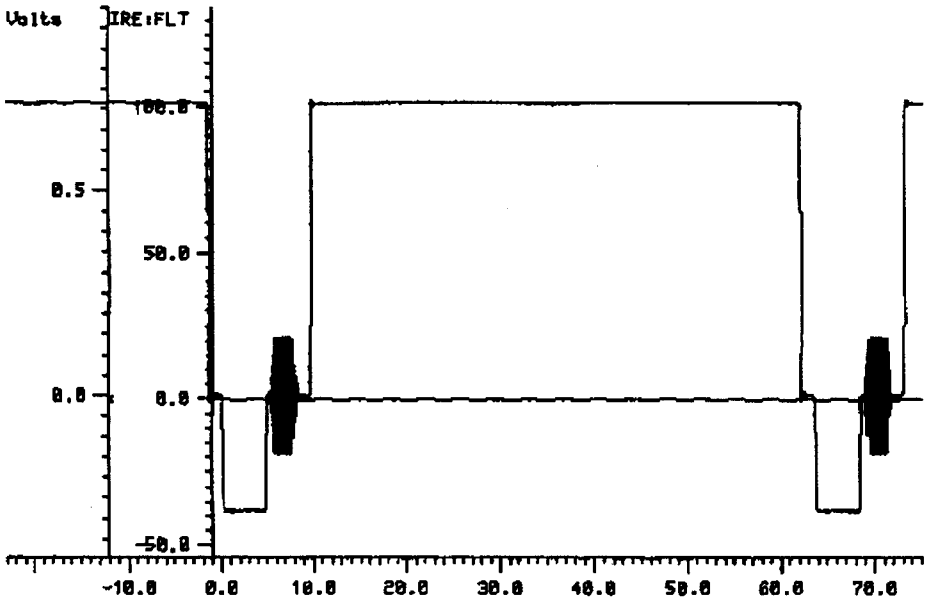


Fig.1-G

TEST PATTERN 8(SECAM 100% WHITE SIGNAL)

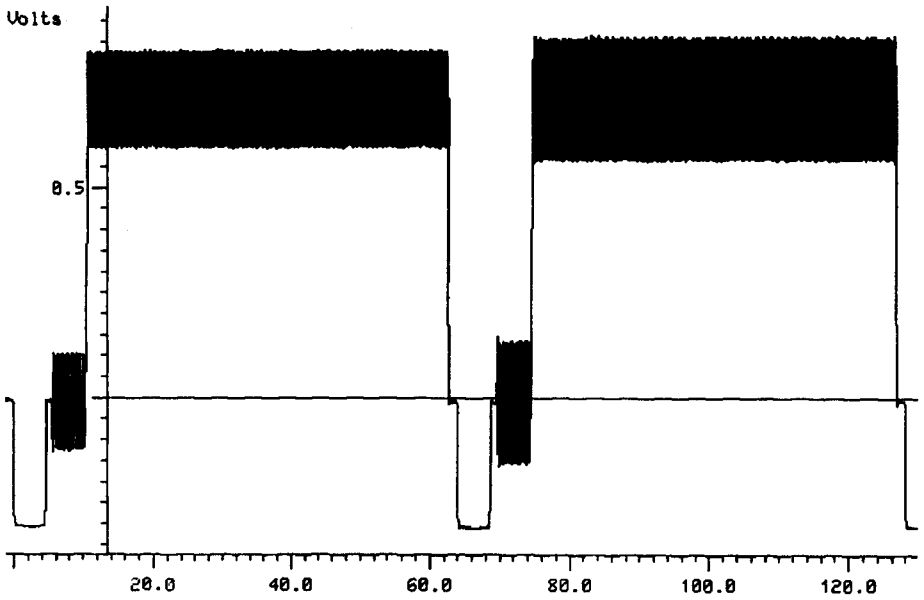


Fig.1-H

TEST PATTERN 9(SECAM MULTI BURST)

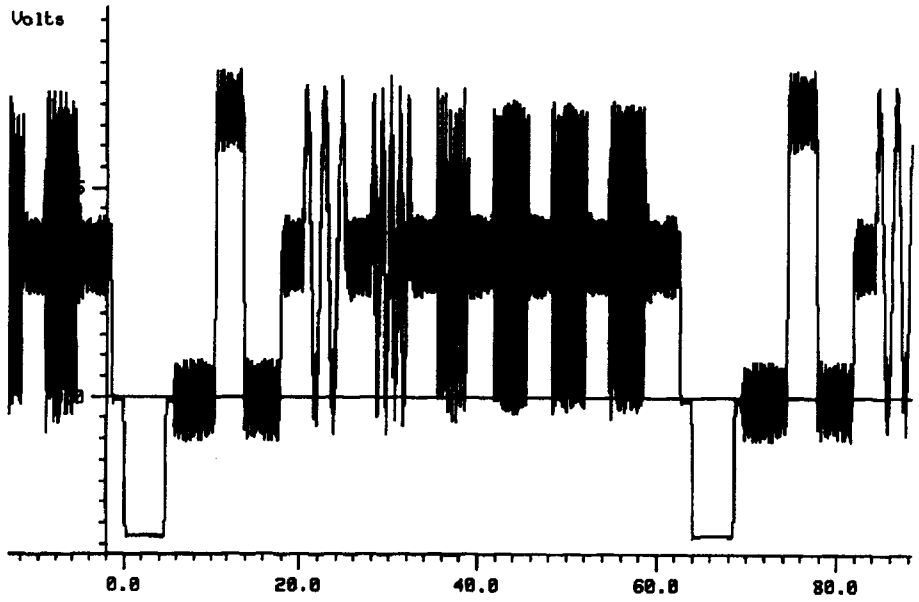


Fig.1-I

CIRCUIT DESCRIPTION

1.GENERAL

Circuits will be described in reference to the QA1650 BLOCK DIAGRAM in Fig.2.
Composite video signal enters via pin jack connector, COMPOSITE VIDEO INPUT CIRCUIT, MODE SELECTOR CIRCUIT,and A/D CONVERTER CIRCUIT,and are converted into digital RGB signals.
Analog RGB signals from IBM PS/2 or Apple MAC II enter via the provided cable, 26-pin connector the COMPUTER ANALOG INPUT CIRCUIT, MODE SELECTOR CIRCUIT and A/D CONVERTER CIRCUIT and are converted into digital RGB signals. Also QA1650 has EXTERNAL MONITOR OUTPUT CONNECTOR, which outputs via COMPUTER ANALOG INPUT CIRCUIT these analog signals after amplifing.
Digital RGB video signals from IBM PC EGA or CGA enter via the provided cable and 26-pin connector COMPUTER DIGITAL INPUT CIRCUIT.
MODE SELECTOR CIRCUIT selects either RGB signal or composite video signal by receiving control signal from IC2(M.P.U.) via IC1. QA-1650 has automatic video recognition function. This is performed by receiving and analyzing H and V sync. and A/D signal from CN3.
When analog RGB signal is chosen, each 8-bit data of RGB converted by A/D CONVERTER CIRCUIT is sent to MODE SELECTOR CIRCUIT. When digital is chosen, data is sent to MODE SELECTOR directly.
They are written into FIELD MEMORY (IC3,4,and 5) in accordance with the timing of FWCK,WRS,OGW which are generated from inputted Hsync, and Vsync in IC1. Since LCD control is asynchronous with the RGB data, writtng data into FIELD MEMORY must be read out in accordance with LCD unit display timing. For the reason, RGB data in the FIELD Memory are read out in accordance with the timing of read out signals (FRCK,RRS,FUE) which generated from IC1. The video data read out from FIELD MEMORY passes LINE BUFFER(IC8, 9, 10), inputted into IC1,corrected for color,and converted into LCD display data(R0~5,G0~5,B0~5).
QA1650 has display enlargement function. These functions are executed by LINE BUFFER(IC8, 9, 10).
IC2 (MPU) controls setting parameter in IC1 via key input on SWITCH P.W.B or REMOTE CONTROL UNIT. Also IC2 controls EEPROM(IC15).Control data changed via key input are held in EEPROM,remaining stored even after power is turned off.

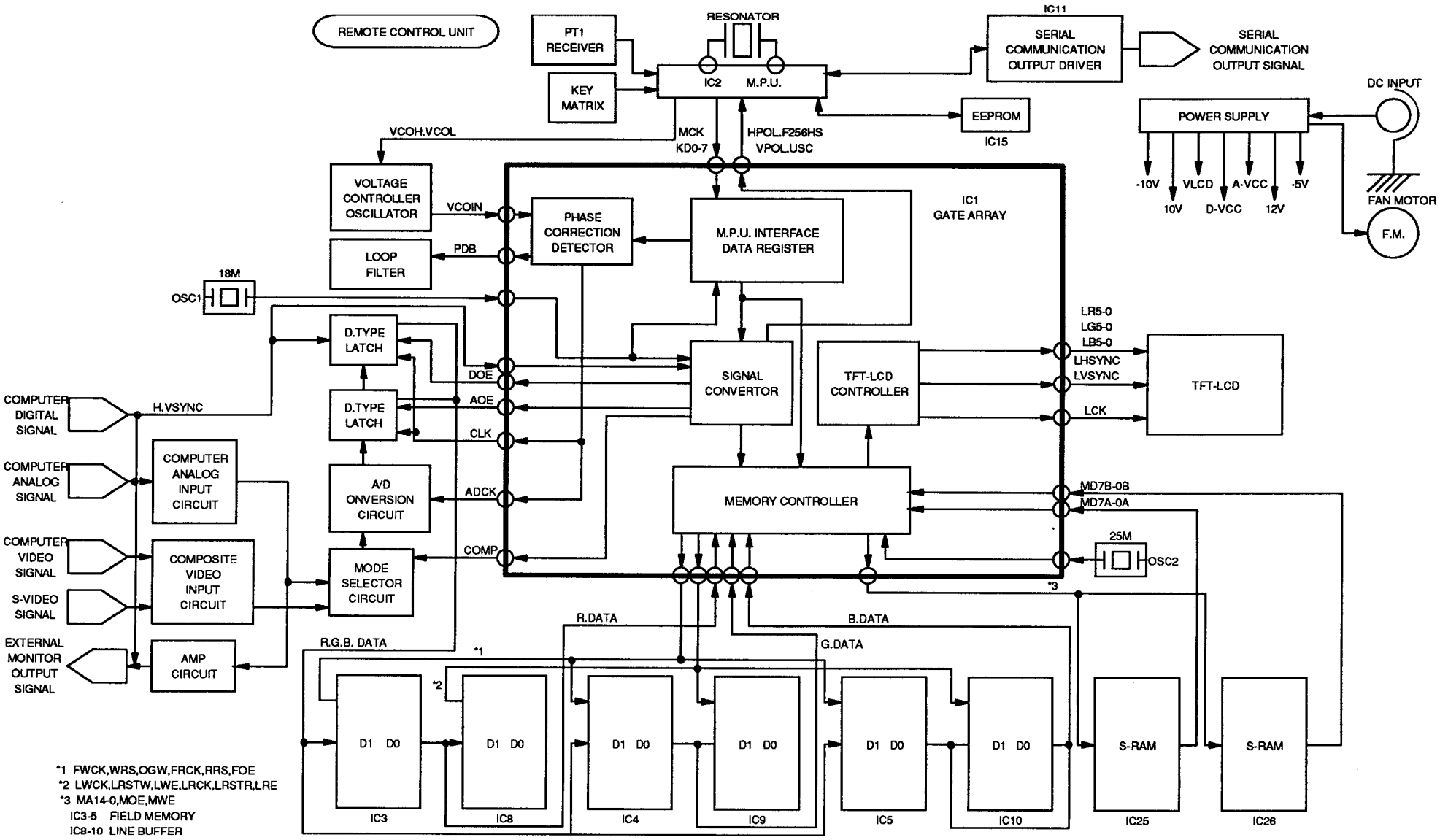


Fig.2 QA-1650 BLOCK DIAGRAM

2.COMPOSITE VIDEO INPUT CIRCUIT

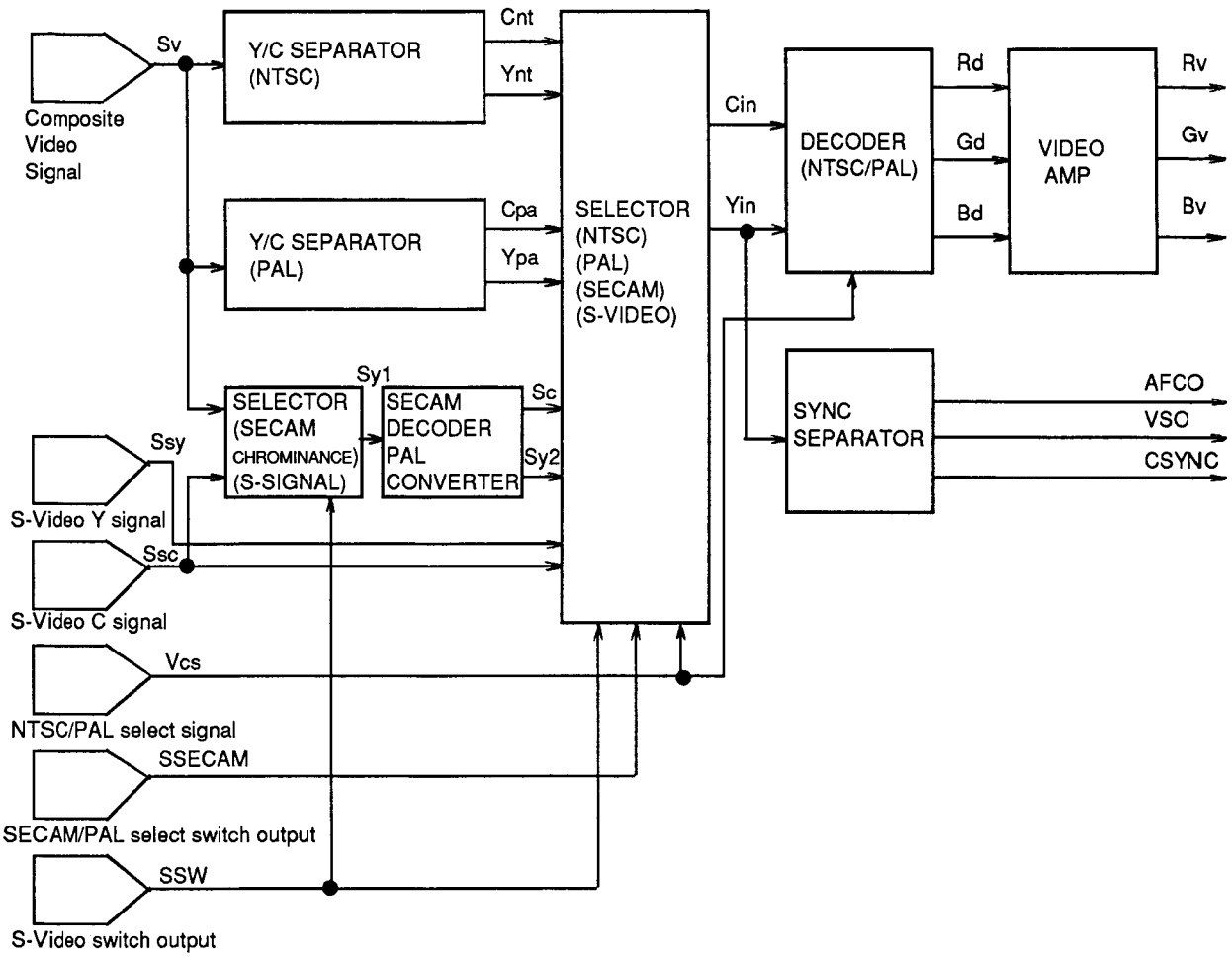


Fig.3 COMPOSITE VIDEO INPUT CIRCUIT BLOCK DIAGRAM

Fig.3 shows a BLOCK DIAGRAM of the COMPOSITE VIDEO INPUT CIRCUIT. The QA-1650 accepts NTSC, PAL, and SECAM mode composite video signals and S-Video signal. Discrimination between NTSC and PAL signals is done automatically by the microcomputer. As for PAL and SECAM signals, the SECAM switch is used for selection. The S-Video signal is given priority in selection by means of the switch mounted in connector, provided that an S-signal connector is connected. When an NTSC or PAL signal is inputted,it is converted into luminance(Y) and chrominance(C) signals in Y/C SEPARATOR. When SECAM or S-Video SECAM signal is inputted, SECAM DECODER and PAL CONVERTER convert the signal into Y and C signals of PAL format after recognizing either one of them by SELECTOR. These Y and C signals and Ssy and Ssc of S-Video signals enter the SELECTOR, where Yin and Cin of relevant signal is selected. Further, Yin and Cin enter the NTSC/PAL DECODER and are demodulated into Rd, Gd, and Bd, which are amplified by the VIDEO AMP and become Rv, Gv, and Bv.

2.1.YC Separator

The YC SEPARATOR is shown in Fig. 4. Composite video signals, input from CN400, pass through buffers Q401 to 405. Then, the signals are turned into luminance signals by separating chrominance signals, and output by the delay lines with built-in trap: FL401, FL402 (for NTSC), FL403, and FL404 (for PAL). The chrominance signals are output by the band-pass filters FL405 (for NTSC) and FL406 (for PAL).

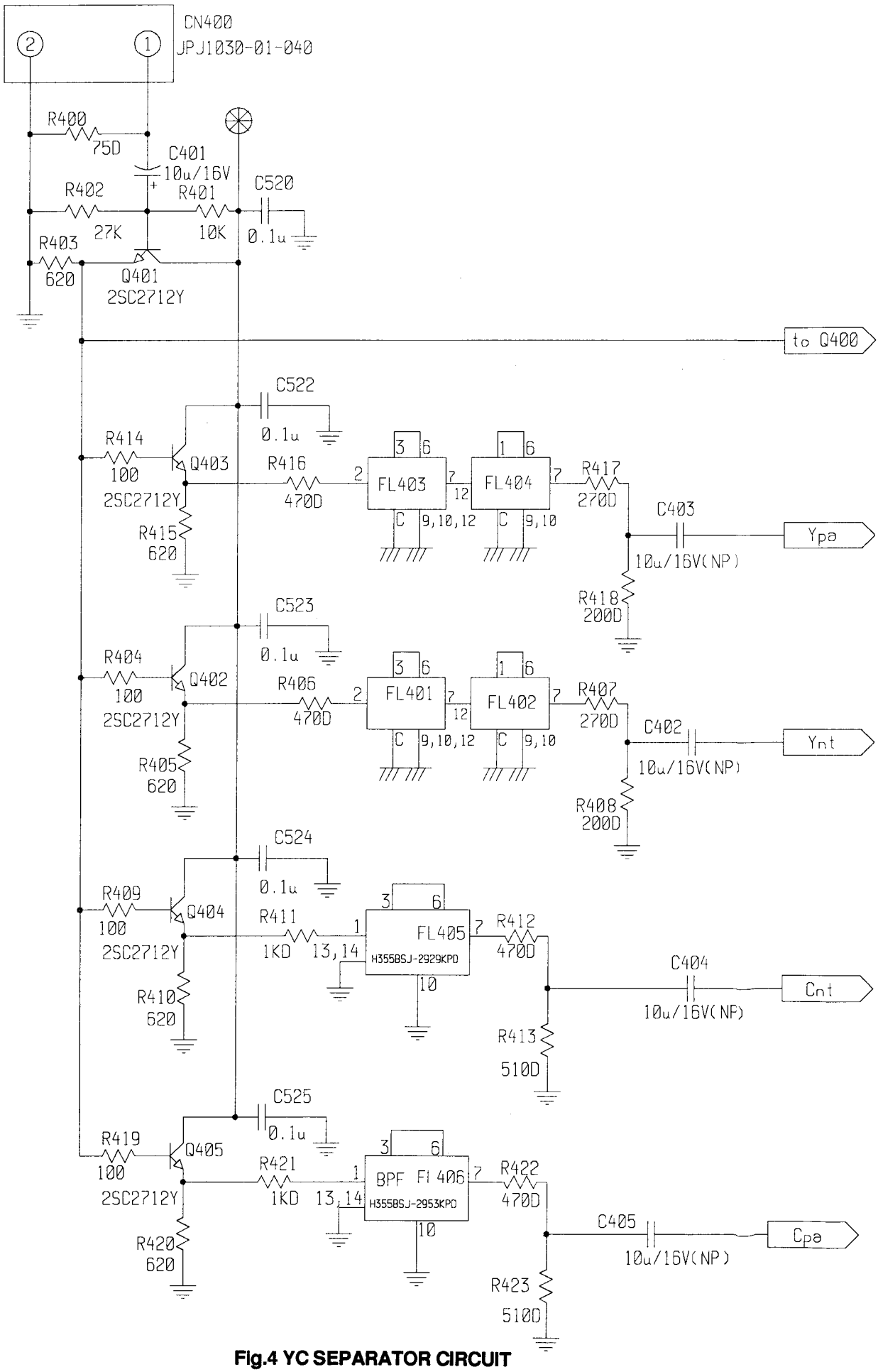


Fig.4 YC SEPARATOR CIRCUIT

2.2.Signal SELECTOR Circuit

Fig. 5 shows a circuit diagram of the NTSC/PAL/SECAM/S VIDEO SELECTOR. This selector is made up of IC404 and IC405 video switches. The Y and C components of NTSC, PAL, SECAM, or S-Video signal enters the selector and the object signal is selected by control signals, such as VCS (NTSC/PAL discrimination signal), SSECAM (SECAM selecting signal), and SSW (S-Video selecting signal).

The SECAM CHROMINANCE/S SIGNAL SELECTOR is the video switch IC403 and is controlled by the S-Video switch, SSW. The Y component of S video signal passes through the buffer Q407 and delay lines FL410 and FL411, and the C component of S-Video signal goes through the buffer Q408, then both enter the video switch.

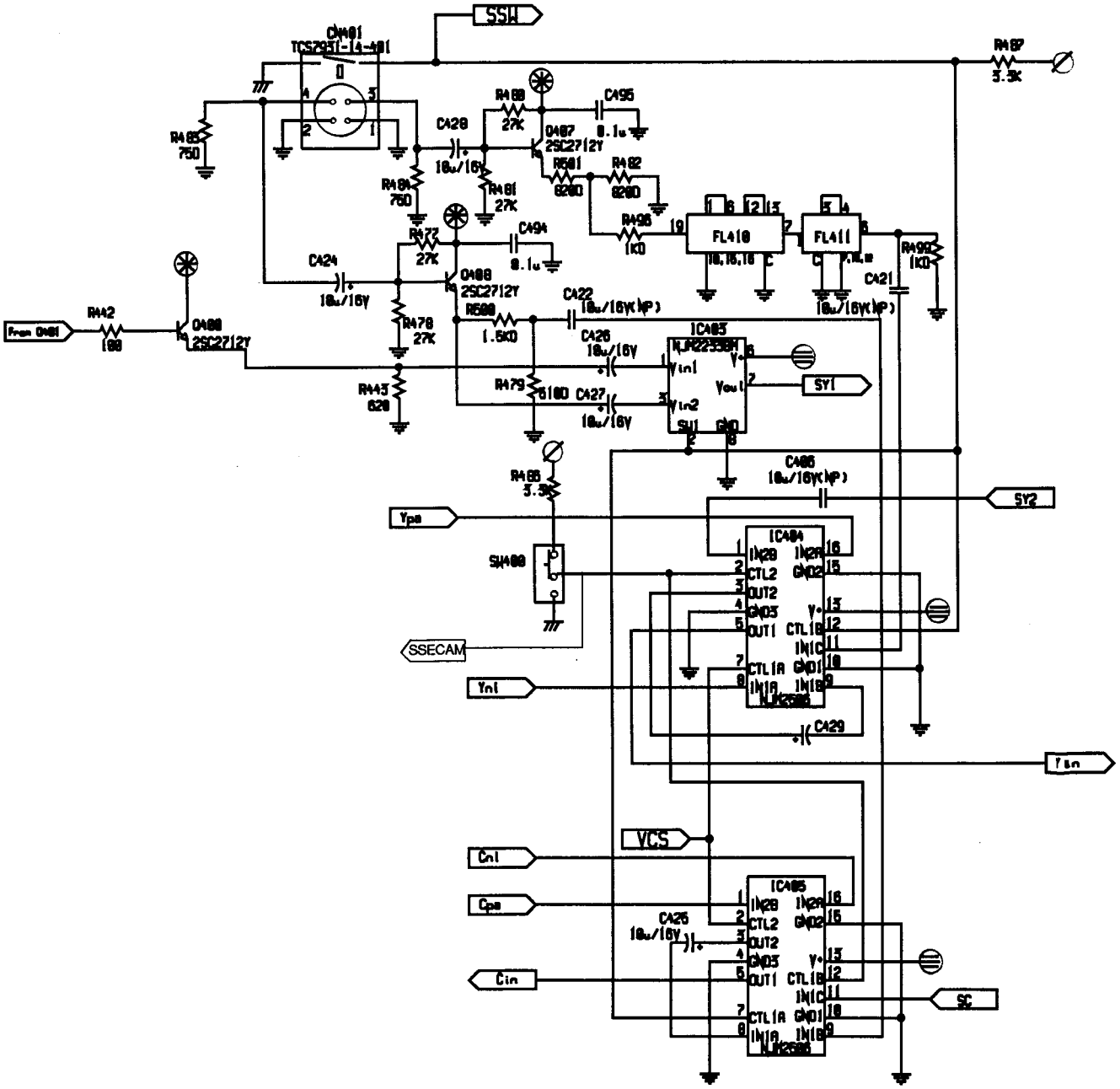


Fig.5 SIGNAL SELECTOR CIRCUIT

2.3.SECAM DECODER and PAL CONVERTER

Fig. 6 shows a circuit diagram of the SECAM DECODER and PAL CONVERTER. The SECAM chrominance signal, SY1, output from the SECAM CHROMINANCE/S SIGNAL SELECTOR enters the SECAM DECODER, IC401, which demodulates the signal into a color difference signal. This is further converted into a PAL format signal and output as SC. This signal is inputted to the NTSC/PAL/SECAM/S VIDEO SELECTOR.

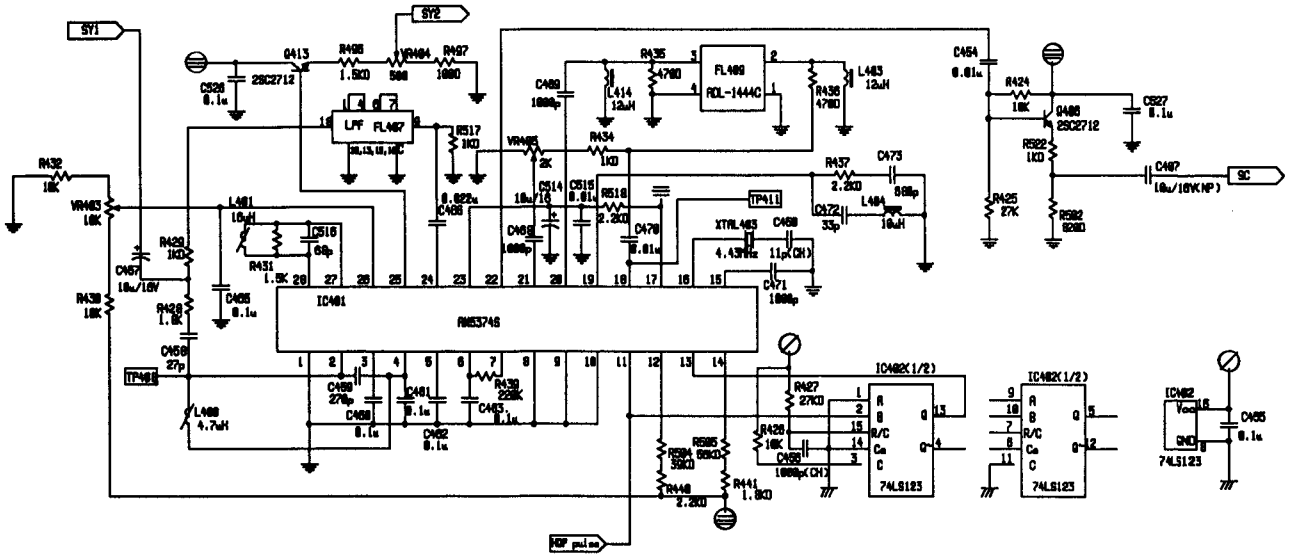


Fig.6 SECAM DECODER AND PAL CONVERTER CIRCUIT

2.4.NTSC/PAL DECODER

A circuit diagram of the NTSC/PAL DECODER is shown in Fig. 7. The Yin and Cin signals outputted from the selector enter the NTSC/PAL DECODER, IC411, which converts these signals into analog RGB signals Rd, Gd, and Bd. The NTSC/PAL discrimination signal, VCS, enters the decoder and the analog switch(IC412).

The discrimination signal then converts the RGB signals into the NTSC or PAL system. Three control signals, BRIGHTNESS, COLOR, and TINT are also inputted to the decoder for adjustments of brightness of image, color density, and hue.

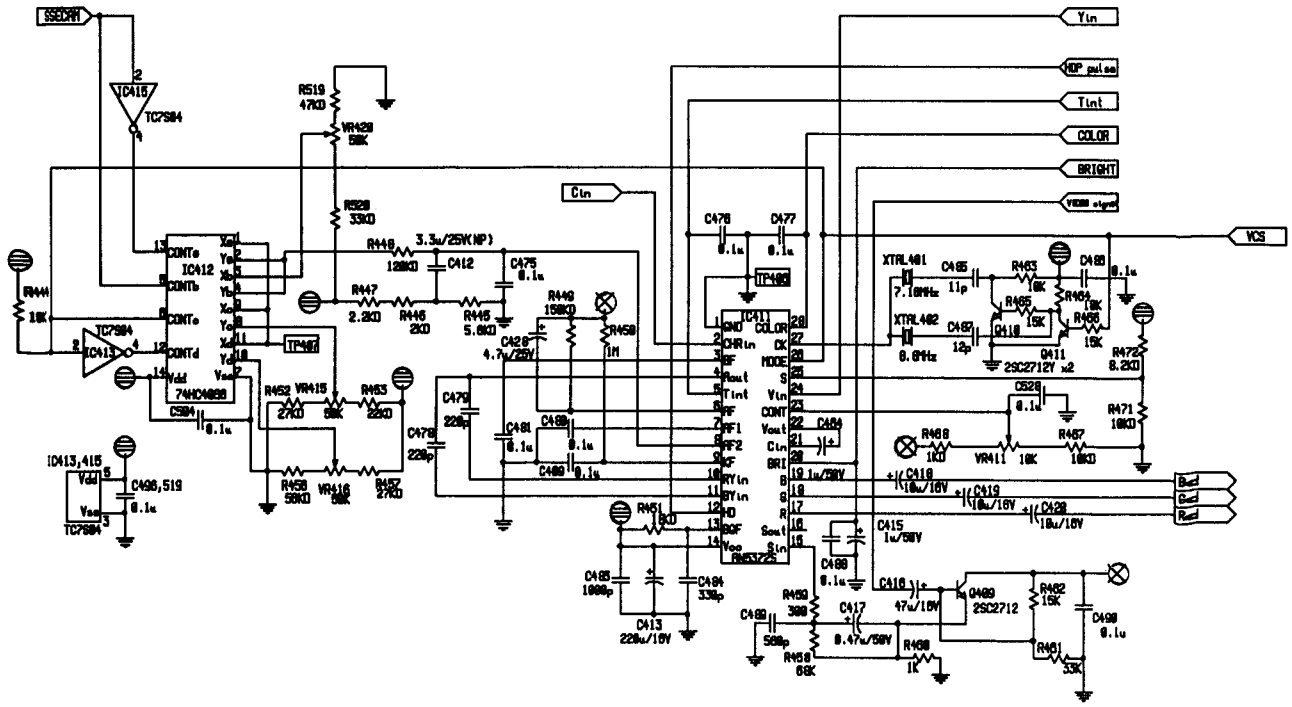


Fig.7 NTSC/PAL DECODER CIRCUIT

2.5.SYNC SEPARATOR

Fig. 8 shows a circuit diagram of the SYNC SEPARATOR. The Yin output from the NTSC/PAL/SECAM/S VIDEO SELECTOR is amplified by the OPE-AMP, IC407, and enters the SYNC SEPARATOR, IC406. Then the AFC, horizontal oscillator, and integration circuit in IC406, function to output horizontal, vertical, and composite sync signals, AFCO, VSO, and CSYNC, respectively.

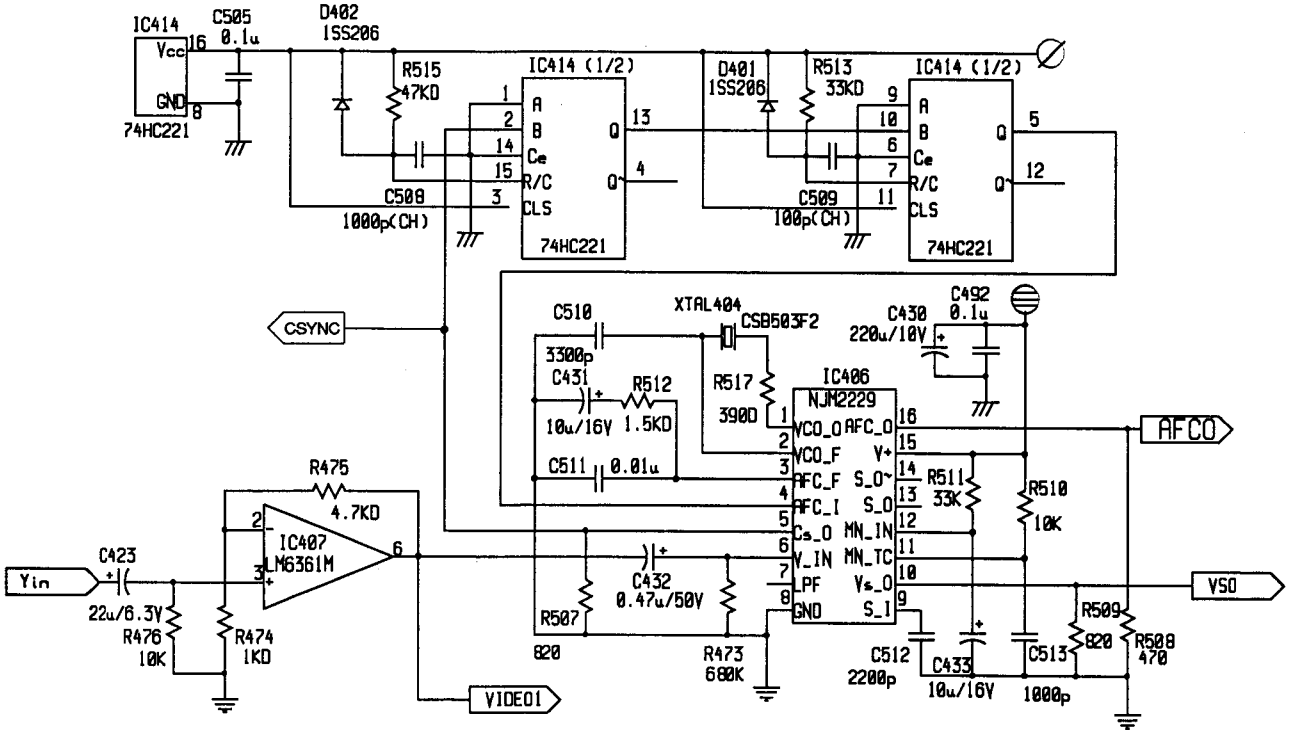


Fig.8 SYNC SEPARATOR CIRCUIT

2.6.VIDEO AMP

A circuit diagram of the VIDEO AMP is shown in Fig. 9. Decoder output signals Rd, Gd, and Bd enter OPE-AMPs IC410, IC409, and IC408 and are amplified to an appropriate level and output as Rv, Gv, and Bv.

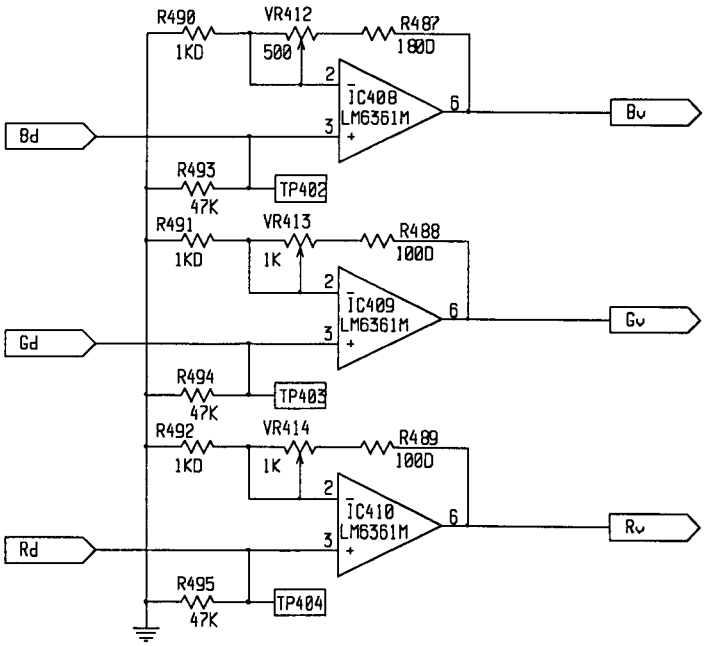


Fig.9 VIDEO AMP

3.MODE SELECTOR AND MONITOR BUFFER CIRCUIT

Fig.10 shows the MODE SELECTOR CIRCUIT. RGB signal data transmitted from computer pass through the buffer made up of Q9, Q10, and Q11 and enter the analog switch, IC37. Decoded composite video signals A-R-C, A-G-C, and A-B-C are also inputted to the analog switch. Selection between these signals is made according to the control data (COMP) of IC1 and the selected one is outputted.

Fig.11 shows the MONITOR BUFFER CIRCUIT. The monitor buffer circuit functions only for analog RGB signals transmitted from computer. After passing through the buffer circuit consisting of Q9, Q10, and Q11, RGB signals are further bufferred by IC31, IC32, and IC33. If analog RGB signals A-R-M, A-G-M, and A-B-M sent from computer are inputted, the monitor buffer circuit outputs data, irrespectively of the control data (COMP) of IC1.

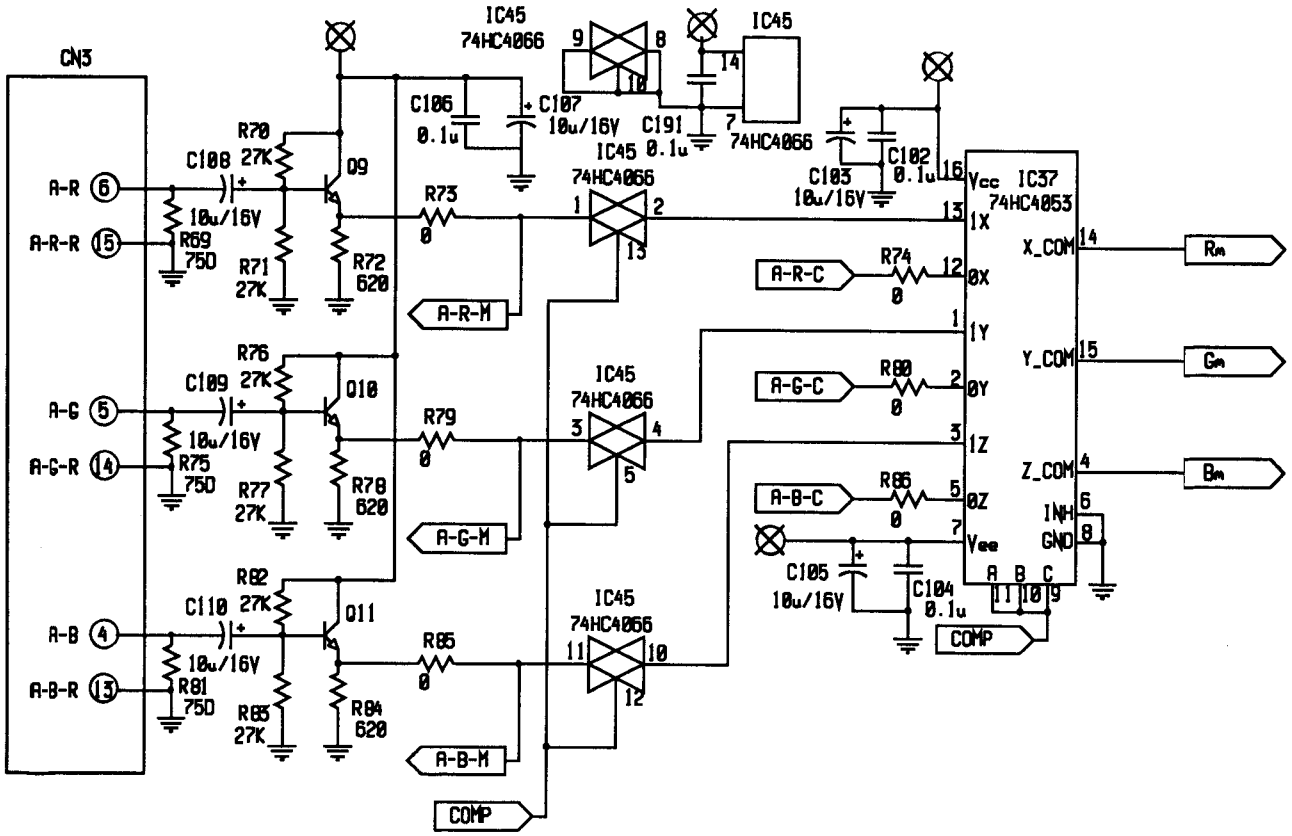


Fig.10 MODE SELECTOR CIRCUIT

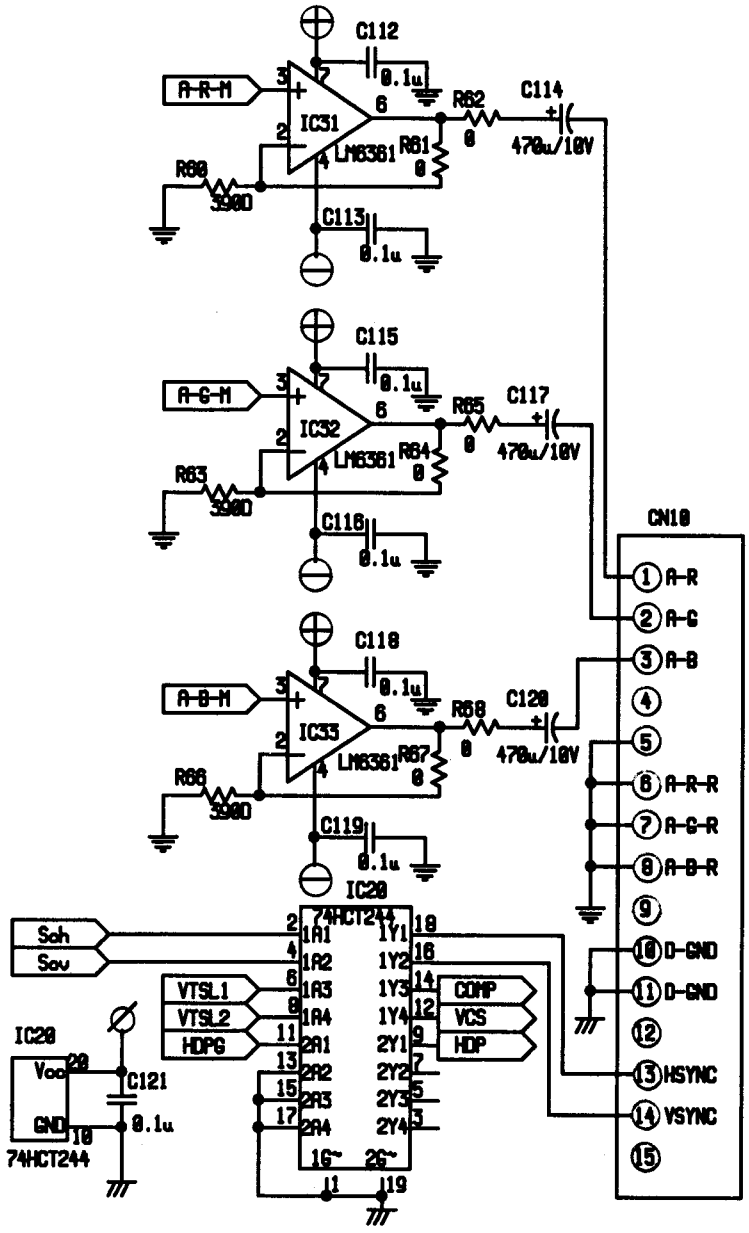


Fig.11 VIDEO AMP FOR EXTERNAL MONITOR AND BUFFER CIRCUIT

4.COMPUTER SIGNAL INPUT CIRCUIT

Fig.44 shows COMPUTER SIGNAL INPUT CIRCUIT. The QA-1650 accepts computer analog RGB signals from IBM PS/2, APPLE MAC Ⅱ, or others and computer digital signals from IBM PC/AT/XT's MDA, CGA, EGA or others. These signals are supplied through a 26-pin connector(CN3), then to the computer analog or digital input circuit.

4.1.Computer digital signal input circuit

Computer digital signal enters pins 1,2,3,10,11,and 12 on CN3 and goes through IC21 and input a FIELD MEMORY.

The following table shows the signals that appear at the input pins for connector CN3.

Table 2

Video Signal	Connector CN3's Pin Number								
	1	2	3	10	11	12	19	20	24
EGA	g	b	r	G	R	B	Vsync	Hsync	GND
CGA	I	X	X	G	R	B	Vsync	Hsync	GND
MDA	I	MONO	X	X	X	X	Vsync	Hsync	GND

× : Don't care or N.C.

4.2.Computer analog signal input circuit

The IBM PS/2 and APPLE MAC II have the following analog signal levels with a 75Ω load.

Table 3

	Computer Analog Signal		
	R	G	B
IBM PS/2	0.7Vp-p	0.7Vp-p	0.7Vp-p
APPLE MAC II	0.7Vp-p	1.0Vp-p (Synchronization signal overlapped)	0.7Vp-p

Computer analog signals are fed to the A/D CONVERTER (IC34 to 36) and converted into 8-bit digital signals corresponding to the threshold values divided into 256 parts with reference voltages given at pins 17 and 23. The table below presents reference voltages applied to the A/D CONVERTER.

Table 4

	VH	VL
Threshold Level	3.8V(variable between 2.8 and 4.8V)	1.0V

4.3.Threshold Level Generator Circuit

To convert computer and composite analog signals into digital, it is necessary to set the threshold level on the A/D CONVERTER.As shown in Fig.12, VRT voltage is settled based on the reference voltage from ZD1. VRT is variable with IC38 setting value, which can be controlled by key operation or by remote control unit to control CONTRAST.

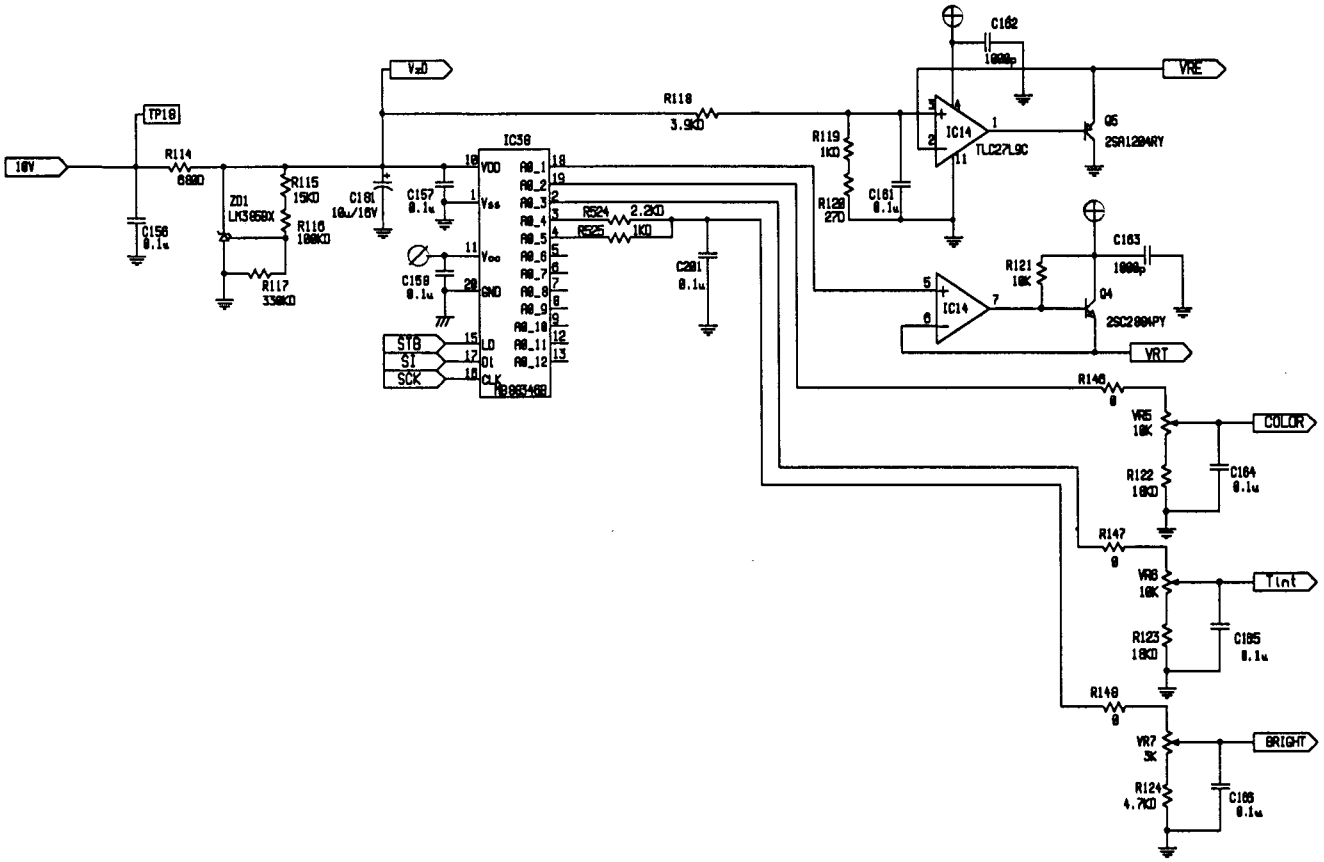


Fig.12 THRESHOLD LEVEL GENERATOR CIRCUIT

5.PLL CIRCUIT

The dot clock is needed to sample video signals from the computer so as to obtain appropriate dot data.

The dot clock (f_{CK}) is generated by the PLL circuit in Fig.13. The horizontal sync (f_H) is compared with the feedback signal (f_F) by the PHASE DETECTOR in IC1. When a phase or frequency error occurs between f_H and f_F, IC1 PDB terminal (pin 122) is at a low or high level.

When the phase and frequency of f_H corresponds with those of f_F, high impedance results. Output signal from the PDB terminal is converted into DC voltage which controls VCO(Voltage Controlled Oscillator), when passed through the LOOP FILTER.

VCO is provided with two oscillators (SP1648).IC28 is the oscillator for high band (20.8 to 30.24 MHz), and IC29 the oscillator for low band (14.4 to 20.8 MHz).For these oscillators, oscillation frequency is determined by varactor diode (D2 and 3) capacitance and coil (L3 and 4) inductance.Oscillation frequency is controlled by varying voltage applied on the varactor diode.

It is judged by IC2 pin 10 (VCOH) and pin 11 (VCOL) after amplified by transistor (Q6 and 7) which VCO (high or low band) should be effective. The controlling voltage from the LOOP FILTER varies oscillation frequency in a direction to correct a phase error detected by the PHASE DETECTOR in IC1.

VCO output (f_{CK}) is sent to IC30 (74HC00) and then to IC1 pin 123 (VCOIN),divided to 1/N by the 1/N VARIABLE DIVIDER and becomes feedback signal fF.The feedback signal is inputted into the PHASE DETECTOR in IC1 and compared with horizontal sync fH.With this loop repeated, VCO output (f_{CK}) inputted from VCOIN becomes the dot signal whose phase agrees with horizontal sync f_H, and whose frequency is N times as large as fH.Division ratio N of the 1/N VARIABLE DIVIDER is controlled by IC1 register (F-latch) depending on the value set on IC2 (M.P.U.).

The set value also can be controlled via key input on the main body or REMOTE CONTROL UNIT.

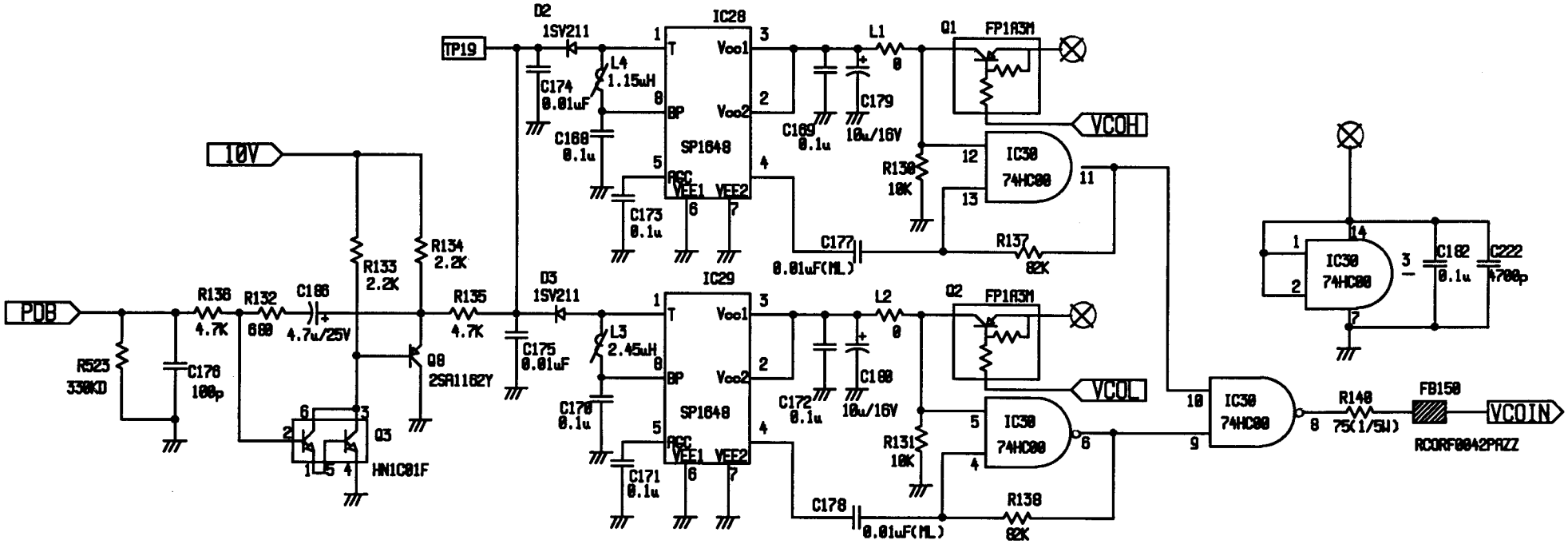


Fig.13 PLL(Phase-Locked-Loop) CIRCUIT

6.LCD CONTROL CIRCUIT

The LCD control signal is slower than the computer video signal. While the video signal is serial, the LCD display data is given as 6-bit parallel data per R,G,and B video signal.To allow computer bit signals to be displayed on LCD, it is necessary to store data for an entire screen in the memory and read the screen data in accordance with the timing to drive the LCD.This is performed by controlling the FIELD MEMORY and the LINE BUFFER with the MEMORY CONTROLLER shown as Fig.2 BLOCK DIAGRAM.

7.MEMORY CIRCUIT

7.1.Writing into FIELD MEMORY

The RGB data generated by A/D CONVERTER CIRCUIT and SIGNAL CONVERTER is written into the FIELD MEMORY(IC3-5) by FIELD MEMORY WRITE SIGNAL and clock(FWCK), which is slightly delayed compared to CLK. Those signals and clock are generated from MEMORY CONTROLLER.

7.2.Reading from FIELD MEMORY and Writing into and Reading from LINE BUFFER

Readout from the FIELD MEMORY is carried out using a clock (SRCK) and the control signals (prepared by the MEMORY CONTROLLER. Readout is asynchronous with writing.

In the normal mode data read out from the FIELD MEMORY are sent to the FIELD MEMORY/LINE BUFFER SELECTOR and, after color correction, sent to the LCD. In the enlargement mode data read out from the FIELD MEMORY are sent to the FIELD MEMORY/LINE BUFFER SELECTOR and at the same time to the LINE BUFFER. When data is in the LINE BUFFER, readout from the FIELD MEMORY is stopped, and the data is read out from the LINE BUFFER to permit enlarged display.

In the 200-line mode the display screen is designed to be automatically enlarged two times vertically.

If enlargement function is put into operation in the 200-line mode, the display screen, already set for 2-times vertical enlargement, gives 2-times horizontal and 4-times vertical enlargement.

7.3.Displaying menu and messages

Display data for menu and messages are stored into ROM area in IC2(M.P.U.). When such operation is performed as pushing menu key, IC2 writes these data and address into SRAM(IC25,26) via IC1, and IC1 reads SRAM data. This data are sent to the LCD in accordance with the timing to drive the LCD.

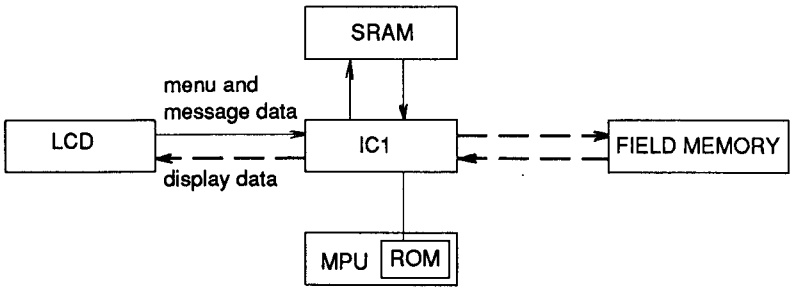


Fig.14

8.LCD UNIT

8.1.Interface signal

(CN1)

Table 5

Pin	Signal	Function
1	CK	Clock signal for sampling each portion of data
2	GND	
3	Hsync	Horizontal synchronizing signal
4	Vsync	Vertical synchronizing signal
5	R3	RED Data Signal
6	R4	RED Data Signal
7	R5	RED Data Signal(MSB)
8	GND	
9	G3	GREEN Data Signal
10	G4	GREEN Data Signal
11	G5	GREEN Data Signal(MSB)
12	GND	
13	B3	BLUE Data Signal
14	B4	BLUE Data Signal
15	B5	BLUE Data Signal(MSB)

(CN2)

Pin	Signal	Function
1	Vcc	+5V power supply
2	Vcc	+5V power supply
3	GND	
4	GND	
5		
6	NBH	Determine the scanning direction either left or right

(CN3)

Pin	Signal	Function
1	R0	RED Data Signal(LSB)
2	R1	RED Data Signal
3	R2	RED Data Signal
4	GND	
5	G0	GREEN Data Signal(LSB)
6	G1	GREEN Data Signal
7	G2	GREEN Data Signal
8	GND	
9	B0	BLUE Data Signal(LSB)
10	B1	BLUE Data Signal
11	B2	BLUE Data Signal
12		
13		
14		

8.2.Sequence Circuit for LCD Panel

Sending data for LCD shall be in accordance with the following power on/off sequence with regard to its LCD panel.

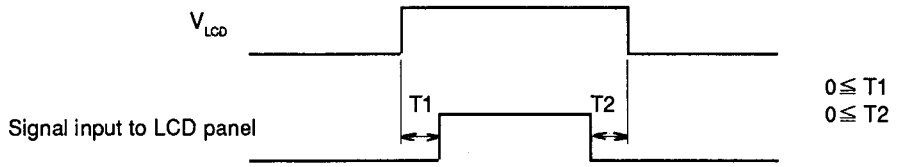


Fig.15 Sequence for LCD panel

Fig.15 shows the power on/off sequence.The comparator, IC39, shown in Fig. 16, detects the level of V_{LCD}. When V_{LCD} is 4.8V or higher, IC 39 enables via IC1 to send data to LCD.

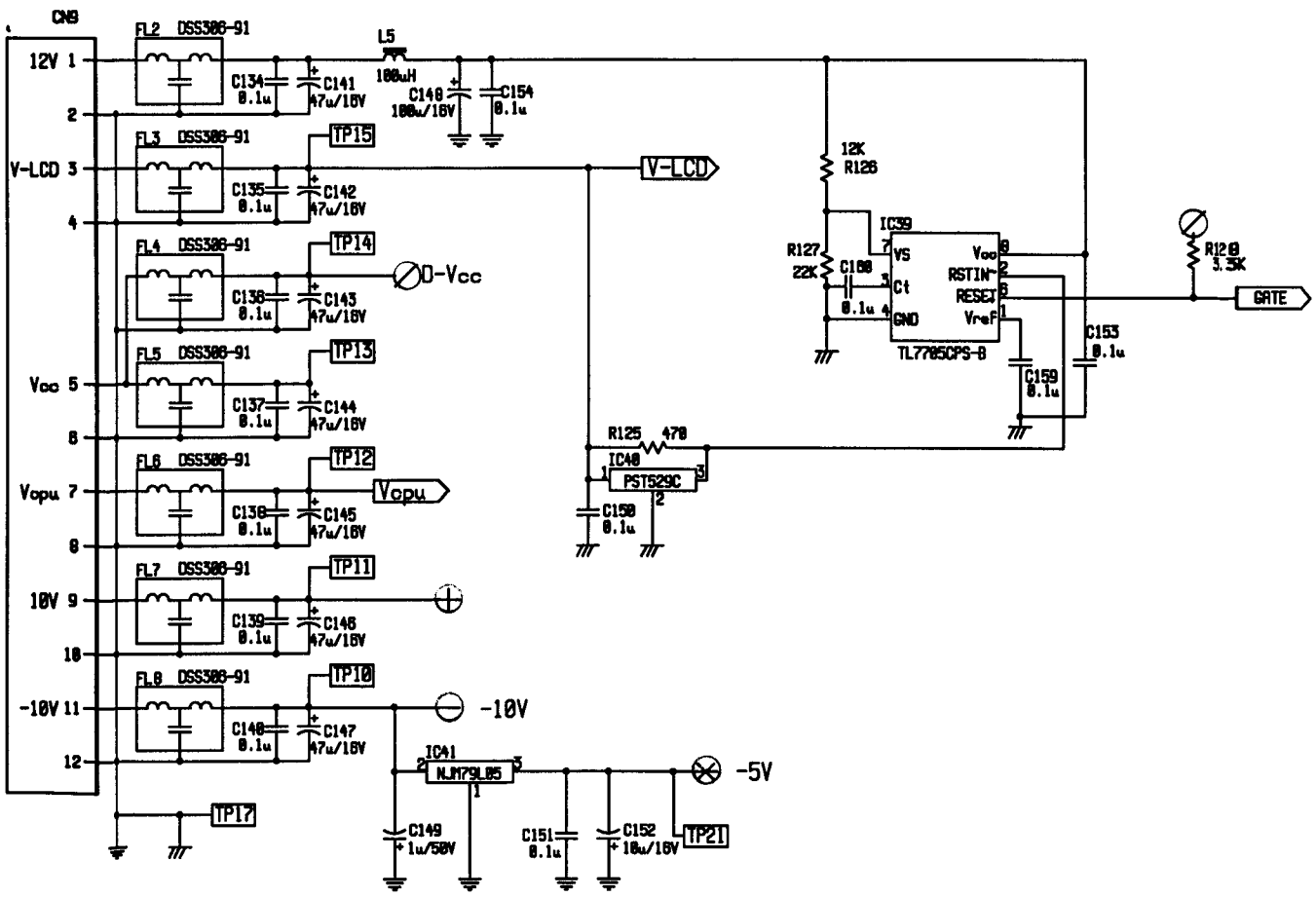


Fig.16 SEQUENCE CIRCUIT FOR LCD PANEL

8.3.Caution for handling LCD UNIT

1. The LCD units are assembled with special high accuracies.Do not disassemble them.
2. The deflector plates are easily scratched.Handle them with care.
3. Rub LCD panel surfaces carefully with absorbent cotton or soft cloth to take off stain or dust.
   To remove dust with compressed air,use filtered one.
4. Note that if water drops are left on the plates for a long time,the LCD panel may become discolored or become blotted.
5. The LCD panels are made of glass. Dropping or hitting against hard substances may cause breakdown or cracking of the panels.Treat them with care.
6. The CMOS LSIs used in the LCD UNITS are sensitive to static electricity.Put them on anti-static mats (conductive mats) and put on grounding wrist-strips.

9.FUNCTIONS OF IC2(M.P.U.)

IC2 (M.P.U. : MC68HC11A8) is a CMOS 8-bit single-chip microcomputer.It contains hardware including an 8-Kbyte ROM,512-byte EEPROM,256-byte RAM,16bit timer system and real time interrupt circuit.The software includes the instructions for strengthening the M6800/M6801 system.In the QA1650 IC2 is used to provide the following control functions.

9.1.Controlling of IC1

IC2(M.P.U.)sets the following display timing parameters into the registers of IC1.

a)Setting of display timing parameters

H-position V-position H-polarity Video type Frequency Phase Contrast
Bright Tint Color

b)Magnified display control

c)Image clear control

d)Freeze control

IC1's register addressing and data inputs are executed according to the timing shown in Fig.17.

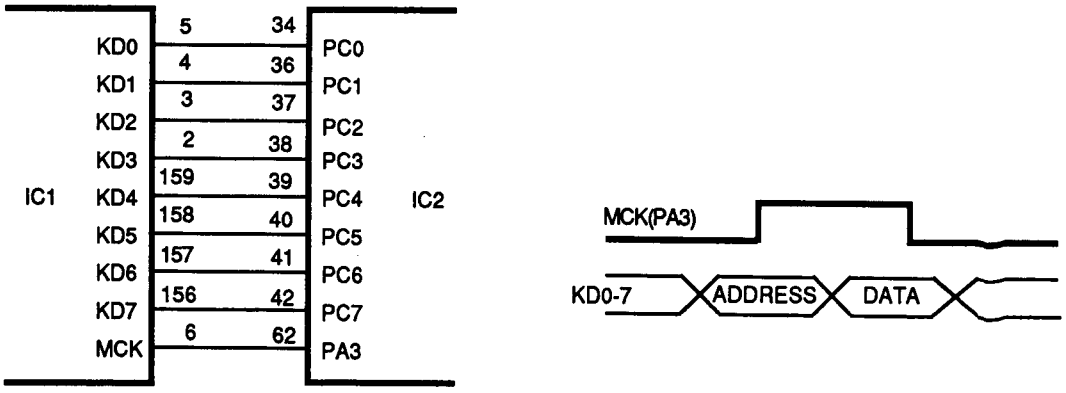


Fig.17

9.2.Key data and their functions

IC2(MPU) always outputs the signals from pin53(PD4), 52(PD3), and 51(PD2) of the SWITCH P.W.B. to monitor if keys are pushed or not. M.P.U. can distinguish which key is pushed from pin5(PB7) and 6(PB6) signals.

1.MENU key

It switches the following setting mode.

(1)Video mode

LCD ADJUSTMENT MODE → VIDEO ADJUSTMENT MODE → DISPLAY MODE →

(2)Computer mode

LCD ADJUSTMENT MODE → DISPLAY MODE →

2.SLCT key

It selects the adjustment or setting item in the selected mode by menu key. Selected characters are inverted.

3. +, − key

They enter the data in the selected item by SLCT key. They adjust the picture quality when LCD ADJUSTMENT MODE or VIDEO ADJUSTMENT MODE is selected, and select parameters when DISPLAY SETTING MODE is selected respectively.

4.RESET key

It sets the data for connected computer and composite video picture quality to initial setting value.

9.3.RESET circuit

IC12(TL7705CPS-B) monitors the power voltage Vcpu for IC2 and its peripheral parts,and generates RESET signal.If the voltage of Vcpu decreases below the detection voltage V_{S1}(TYP 4.5V) when the power is turned off,IC12 shifts the RESET signal level to "L".If the voltage increases and exceeds the detection voltage V_{S1} plus hysteresis width V_{HYS1}(TYP 15mV),IC12 starts charging the timing capacitor with a constant current.After the pulse width of t_{P0}(=1.3×Ct×10^4(s)),IC12 shifts the RESET signal level to "H".(Fig.18)

IC13(S-8054ALB) monitors the power voltage Vcc to generate power-OFF detection signal.If the voltage of Vcc decreases below the detection voltage V_{S2}(TYP 4.15V) when the power is turned off,IC13 shifts the power-OFF detection signal level to "L".When the detection voltage of Vcc increases and exceeds the detection voltage V_{S2} plus hysteresis width V_{HYS2}(TYP 200mV) when the power is turned on,IC13 shifts the power-OFF detection signal level to "H".(Fig.19)

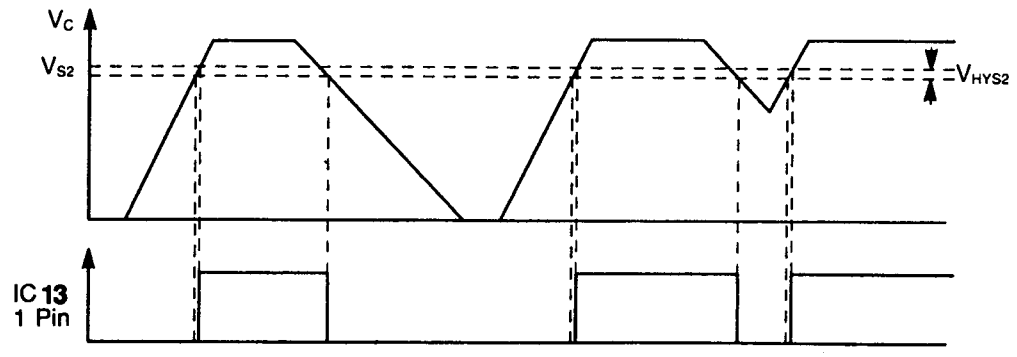


Fig.19

9.4.Operation of Vcc ,V_{CPU} and IC2(M.P.U.)

Vcc and V_{CPU} increase with the power being turned on. If Vcpu exceeds $V_{S1}+V_{HYS1}$,the RESET signal is shifted to "H" level with the timing given in Fig.21. IC2's reset operation is canceled. The program is executed. If Vcc decrease sharply below V_{S2} when the power is turned off,the power OFF detection signal is shifted to "L".On the other hand,Vcpu is backed up by C1(27mF) capacitor so that it can maintain 4.5V for the time duration of t_W after the trailing edge of the power OFF detection signal.See Fig.21(t_W is the time to input the data into EEPROM on IC2).If Vcpu decrease below V_{S1},the RESET signal level is shifted to "L".Then IC2 starts reset operation.

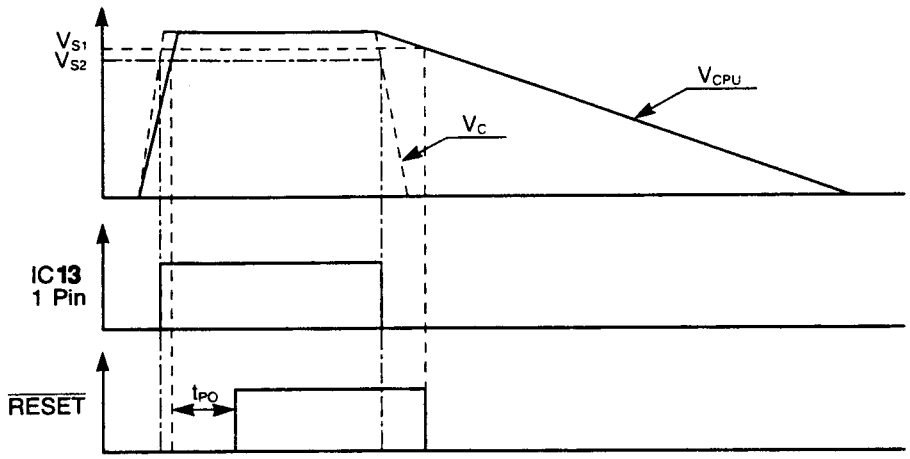


Fig.20

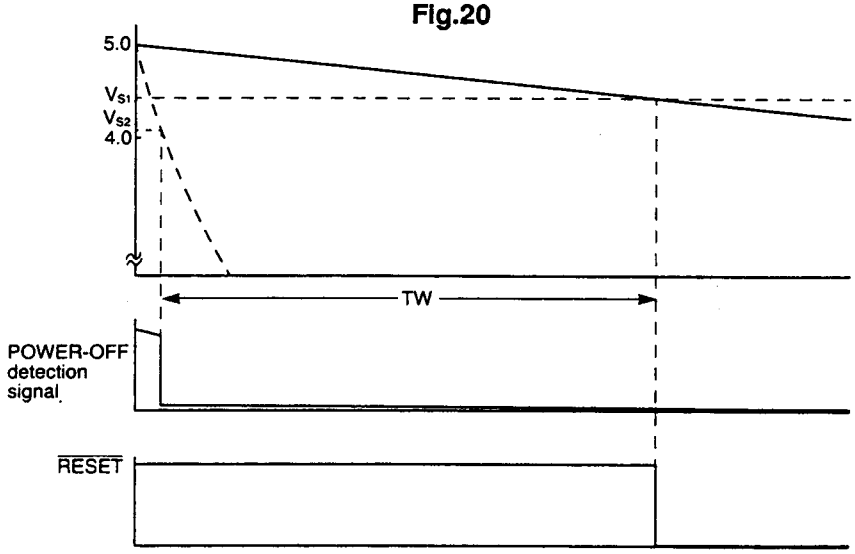


Fig.21

9.5.Computer signal automatic identification

This function distinguishes the video signal from the computer connected to the QA-1650, and automatically adjusts input timing in IC2(M.P.U.).

The following signals (1)~(4) are sent from IC1 to IC2 to enable IC2 to perform the automatic indentification.

(1)VSC(IC1,pin 11)

It is the vertical synchronizing signal of the video signal from the connected computer.IC2 measures the period of this signal.

(2)VPOL(IC1,pin 10)

It indicates the polarity of the vertical synchronizing signal of the video signal from the connected computer.

(3)F256HS(IC1,pin 9)

It is the horizontal synchronizing signal of the video signal from the connected computer,divided by 256. IC2 measures the period of this signal.

(4)HPOL(IC1,pin 8)

It indicates the polarity of the horizontal synchronizing signal of the video signal from the connected computer.

IC2 identifies the type of computer from above information (1)~(4) and writes the parameters into the registers on IC1 for automatic setting.

Identifying of no connection:

If F256HS signal remains unchanged for a certain period(approximately 130ms),IC2 identifies "no connection", turns both VCOH and VCOL to "L" level to stop VCO function,and displays demonstration picture.

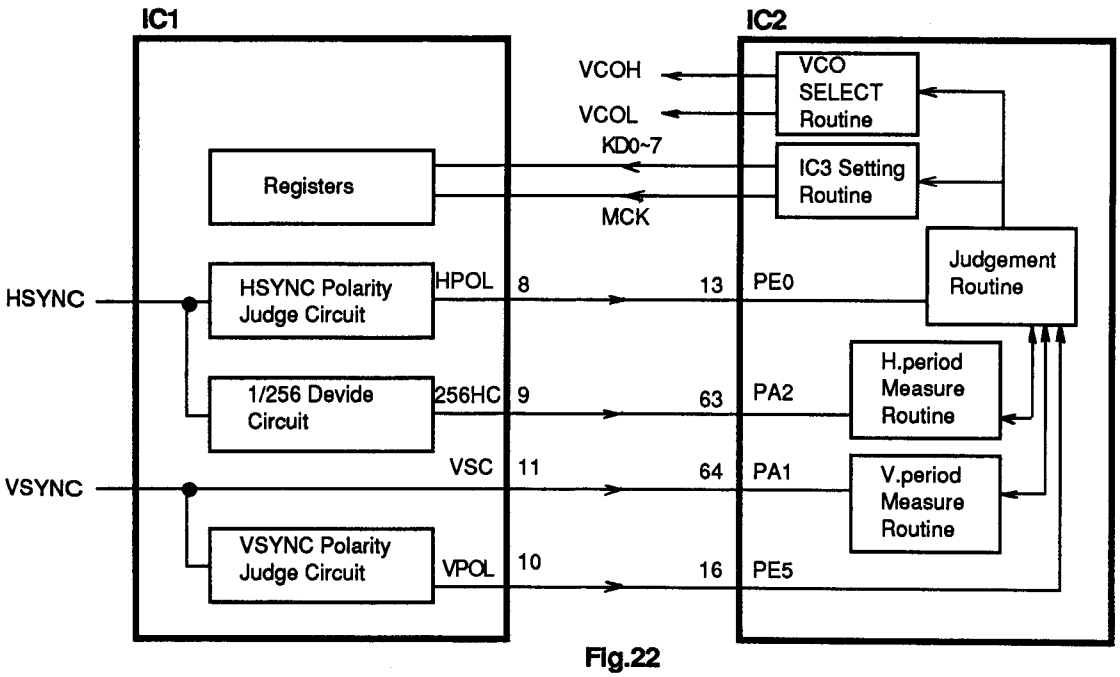


Fig.22

9.6.EEPROM control function

IC2(M.P.U.) has the EEPROM for writing timing parameters of all computers that can be connected to QA-1650.

The timing setting value is written into the EEPROM under the following four conditions:

1. ALL RESET functioning
2. RESET functioning
3. Turning the power off
4. Changing the computer connected

Writing into the EEPROM when turning the power off,however,is carried out only when the setting value is altered by key entry.

10.POWER SUPPLY

The AC adaptor that comes with the QA-1650 supplies a regulated power voltage VIN (12 VDC) to the QA-1650. From VIN, power 5 V (V_{CPU}, D-V_{CC}, and A-V_{CC}), 10 V, -10 V, power 12V for LCD, power for PLL (VVCO) and fan motor (Vfan) are generated.

10.1.DC-DC Converter for 5 V (V_{CPU} and V_{CC})

IC200 in Fig. 23 is a controller for a fixed frequency pulse width modulation (PWM) switching regulator and has two constant voltage controllers.One controller is used to generate a 5V power supply (V_{CPU}, D-V_{CC}) from the input power supply VIN (12 VDC) (the other one is for V_{LCD}).

IC200 has a saw-tooth wave oscillator built in whose oscillating frequency is determined by capacitor C301 connected to pin 1 and resistor R303 connected to pin 2. In this circuit configuration, a saw-tooth wave of approximately 75 kHz is observed at pin 1 of IC200. Basically this saw-tooth wave is compared with a control signal observed at pin 5 of IC200. Only while the voltage of the saw-tooth wave is lower than the control signal voltage, pin 7 of IC200 becomes "H", as a result external transistors Q201 and Q200 become conductive.The output voltage is fed back to pin 3 of IC200 after dividing R300, R301, and VR300.

A reference voltage of 2.5 V is outputted from pin 3 of IC200. An error amplifier in IC200 makes a comparison between the half of the reference voltage and the feedback signal to pin 3 and generates a control signal (pin 5 of IC200). As explained above the output voltage is stabilized by the pulse width from pin 7, which is generated by comparing the control signal with the saw-tooth wave.

TP206(V_{CPU}) is adjusted to 5.1 V with VR300 while TP208(D-V_{CC}) is 5.0V. This is because the load on the V_{CC} is greater than the load on V_{CPU} and the forward voltages of D212, D213, and D214 are higher than that of D211.

The voltage supplied to pin 6 of IC200 is called a dead time control signal. It controls the maximum ON period of the output transistor in IC200. In the QA-1650 configuration this control to have the maximum ON period is realized on IC200 by shorting pin 6 and pin 16.

10.2.DC-DC Converter for 5 V (V_{LCD})

The saw-tooth wave oscillator of pin 1 of IC200 is used also for the control of this 5V power supply (V_{LCD}).The operation of the circuit is similar to that of the other 5V power supply (V_{CPU} and D-V_{CC}).The output voltage is fed back to pin 14 of IC200. The control signal is produced using a voltage generated by dividing the reference voltage inputted to pin 13 of IC200, and the feedback signal.The output voltage is stabilized by the pulse width from pin 10, which is generated by comparing the control signal with the saw-tooth wave.The V_{LCD} of TP207 is adjusted to 5.0 V with VR301.

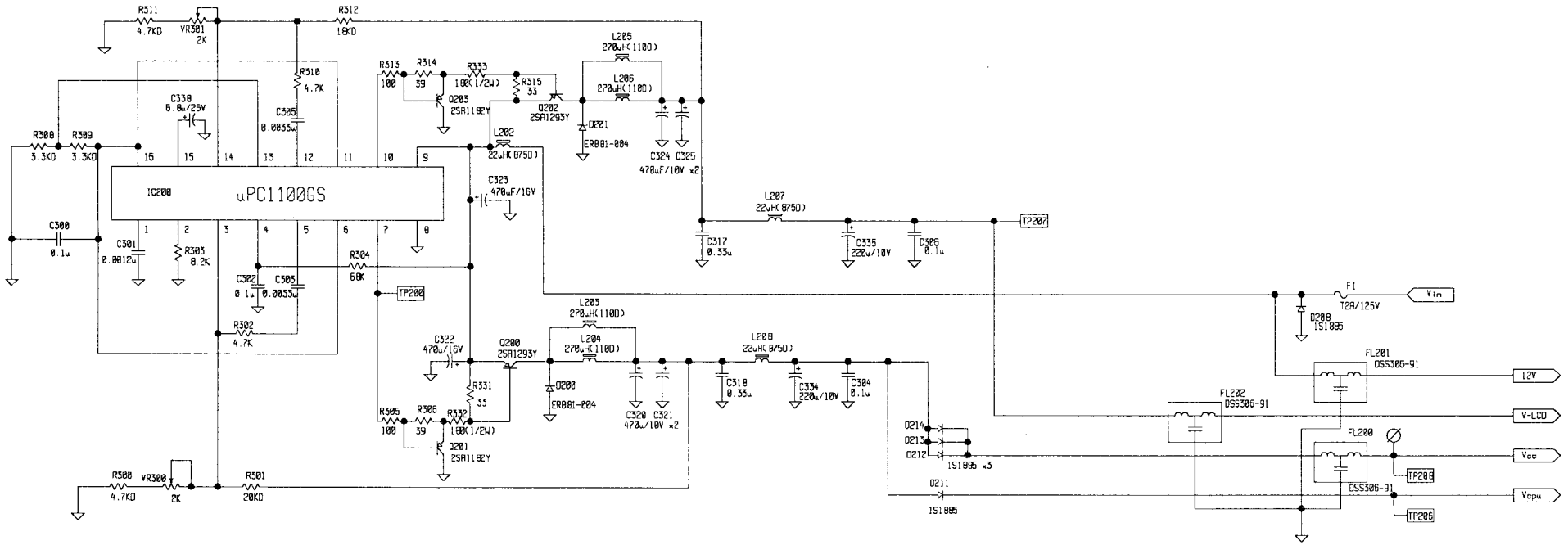


Fig.23 +5V(V_{CC},V_{CPU},V_{LCD}) POWER CIRCUIT

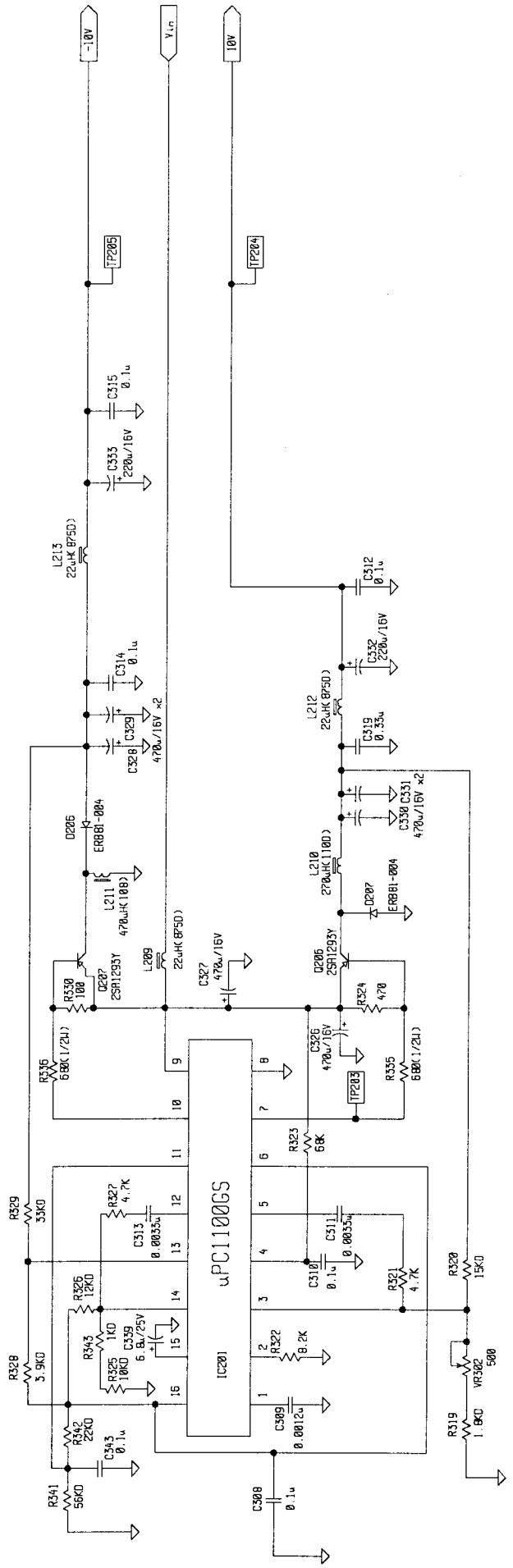


Fig.24 ± 10V POWER CIRCUIT

10.3.DC-DC Converter for 10V

The DC-DC converter that generates 10V is shown in Fig. 24.The 10V power is generated from the input power supply VIN (12 VDC) through the switching regulator IC201 of the same product type as IC200.The frequency generated by the saw-tooth wave oscillator is approximately 75 kHz as generated by IC200.The circuit operates on the same principle as that for the DC-DC converter for 5V.The output voltage is fed back to pin 3 of IC201 after dividing R319, R320, and VR302.The output voltage is stabilized by controlling external transistor Q206 by means of the pulse width from pin 7 of IC201.The 10V power supply of TP204 is adjusted to 10V with VR302.

10.4.A-Vcc

A-Vcc(DC5V) is generated from 10V line described in 10.3. via series regulator(IC203). Voltage of TP210 is settled to 5V by adjusting VR304.

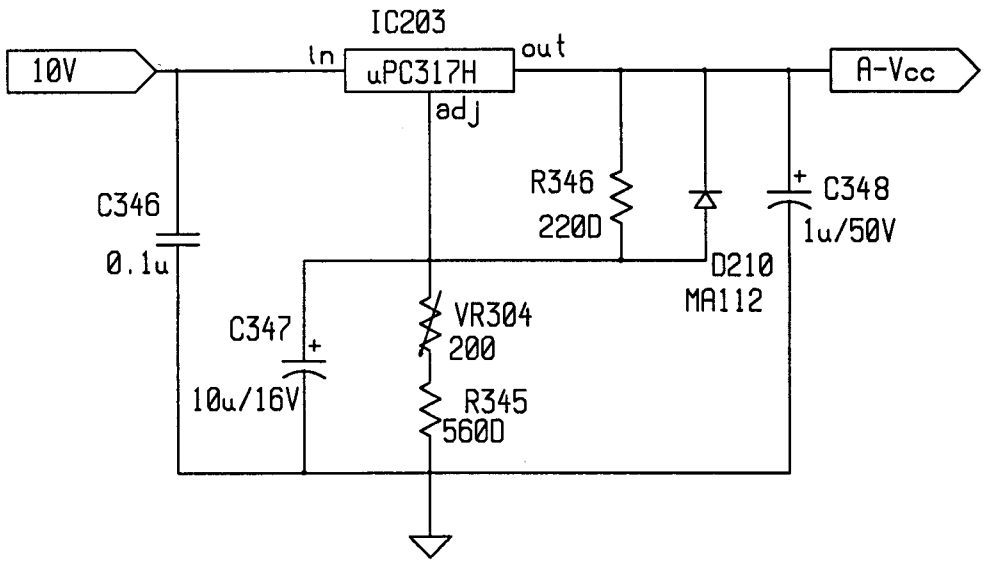


Fig.25 A-Vcc

10.5.DC-DC Converter for -10 V

The other one of the constant voltage controllers in IC201 in Fig. 24 is used to generate -10V power supply from the input power supply VIN (12 VDC). The saw-tooth wave oscillator that is used for control of the 10V power supply on IC201 is employed also for the generation of the -10V.The circuit operation is similar to that of the DC-DC converter for generation of 10V.

The output voltage is fed back to pin 13 of IC201 and is stabilized by controlling external transistor Q207 by means of the pulse width from pin 10 of IC201.The -10V is observed at TP205 with no adjustments made.

10.6.Power supply for PLL

Fig.26 shows the power supply VVCO for the PLL circuit. +10V is generated by a series regulator from the input power supply Vin(12VDC).

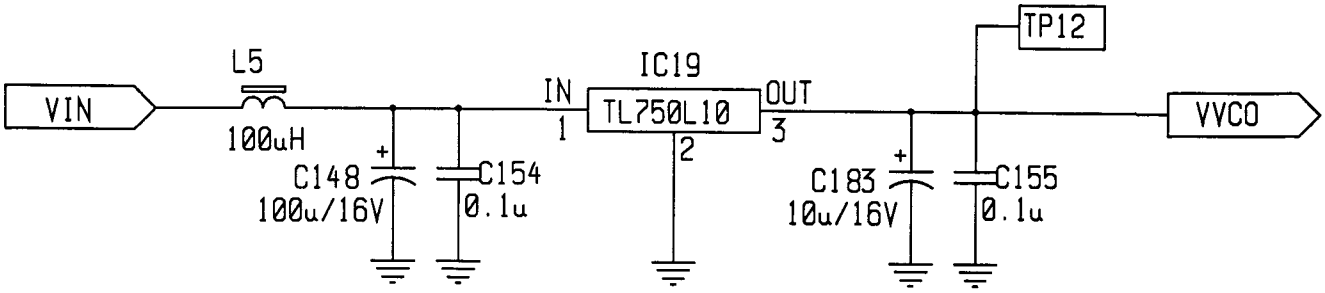


Fig.26 POWER SUPPLY FOR PLL CIRCUIT

10.7.-5V Power Supply

Fig.27 shows the -5V power supply.The -5V power supply is generated through a series regulator(IC41) from the -10 V line.

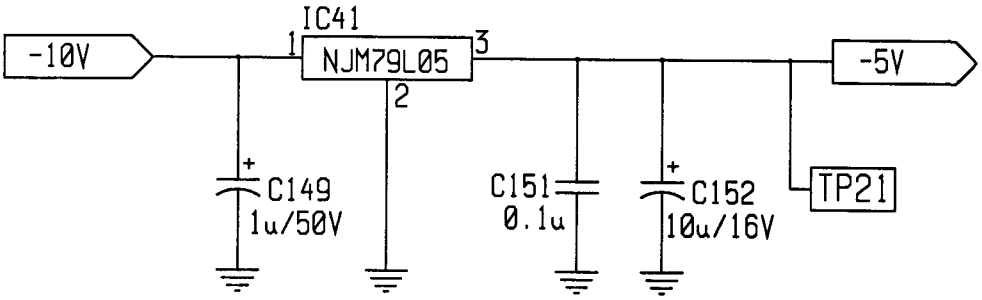
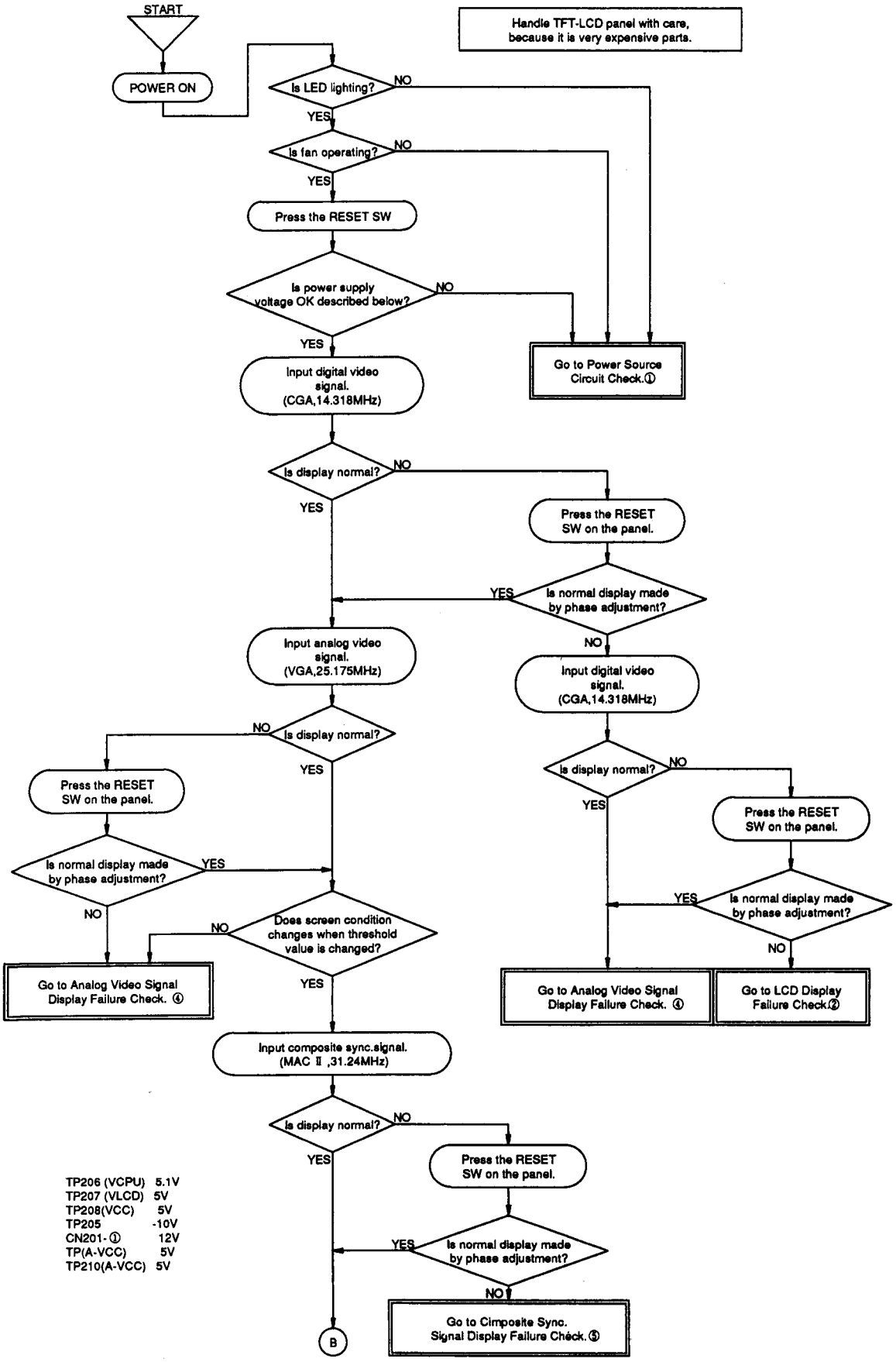
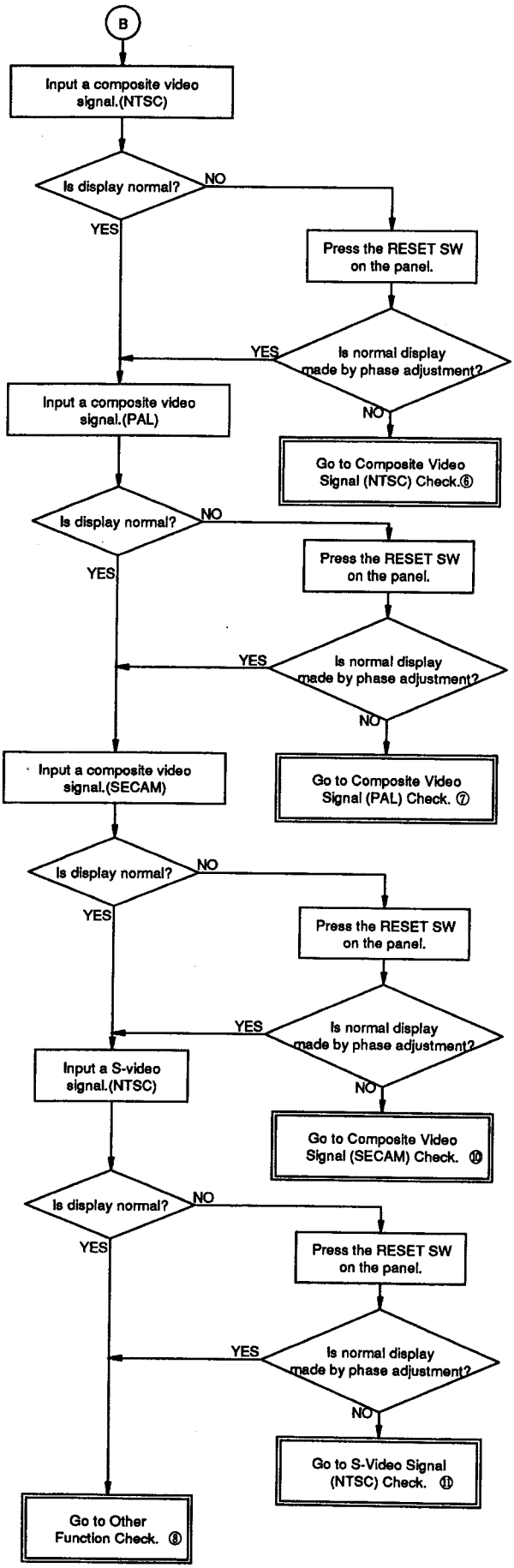
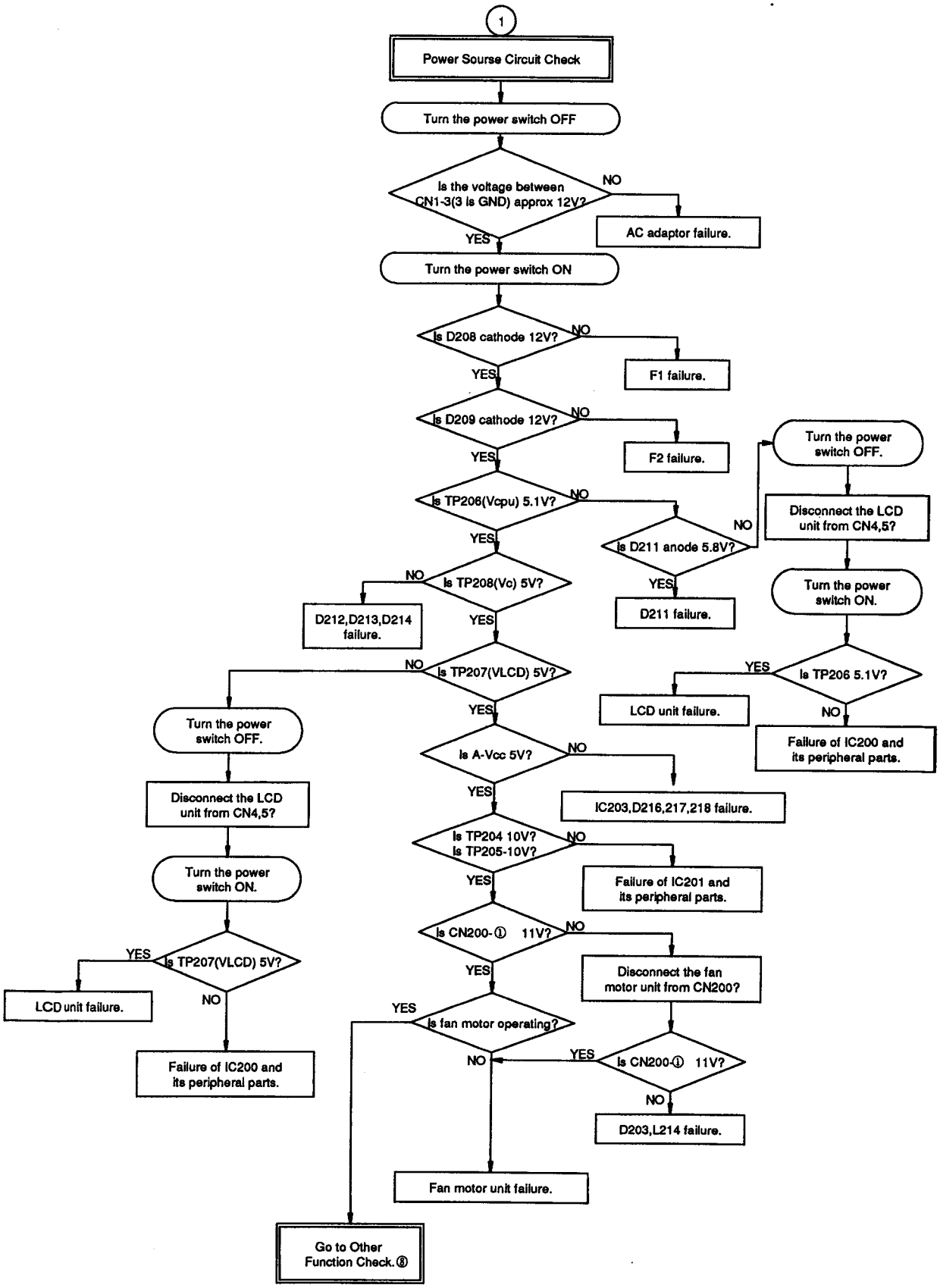


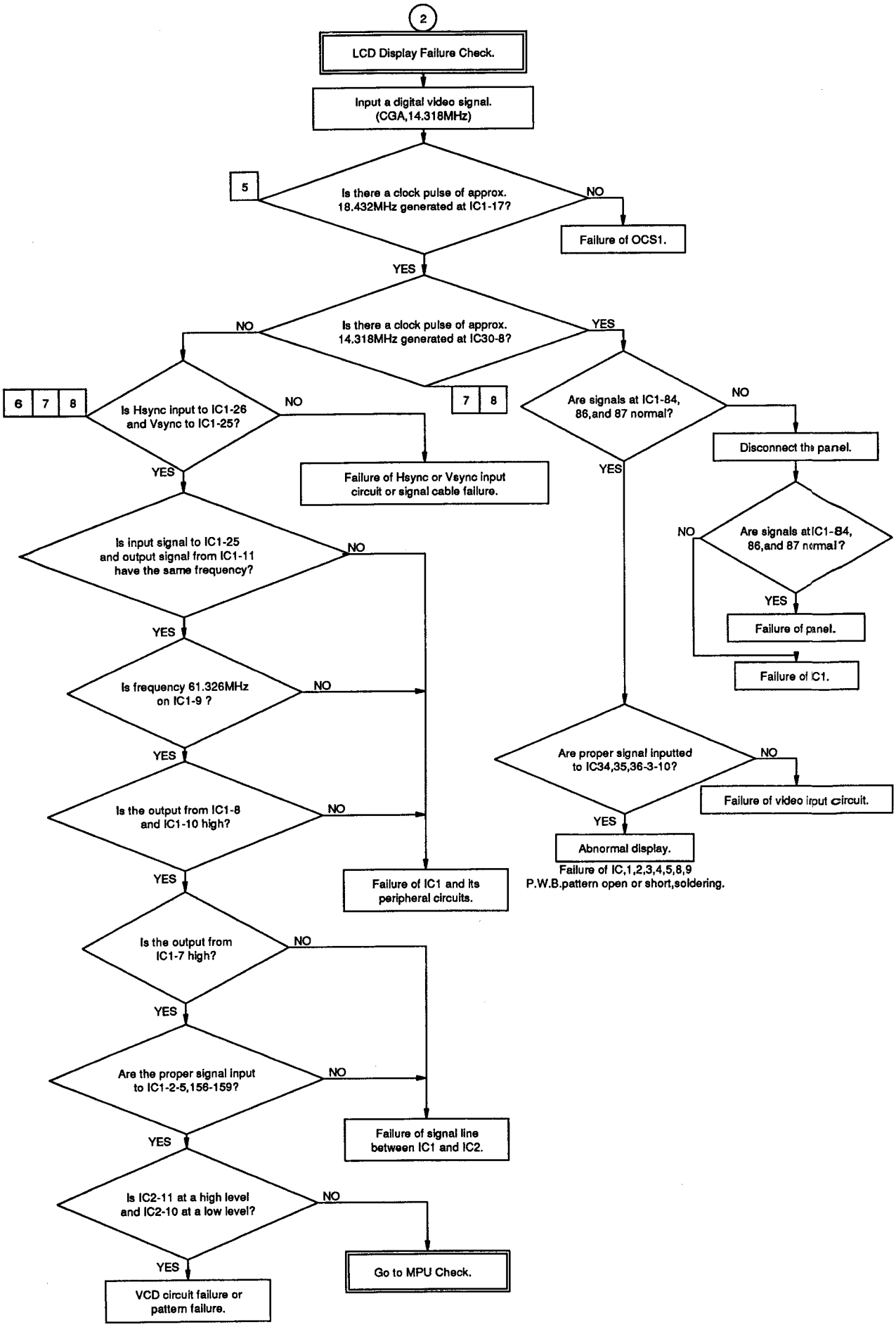
Fig.27 POWER SUPPLY CIRCUIT FOR -5V

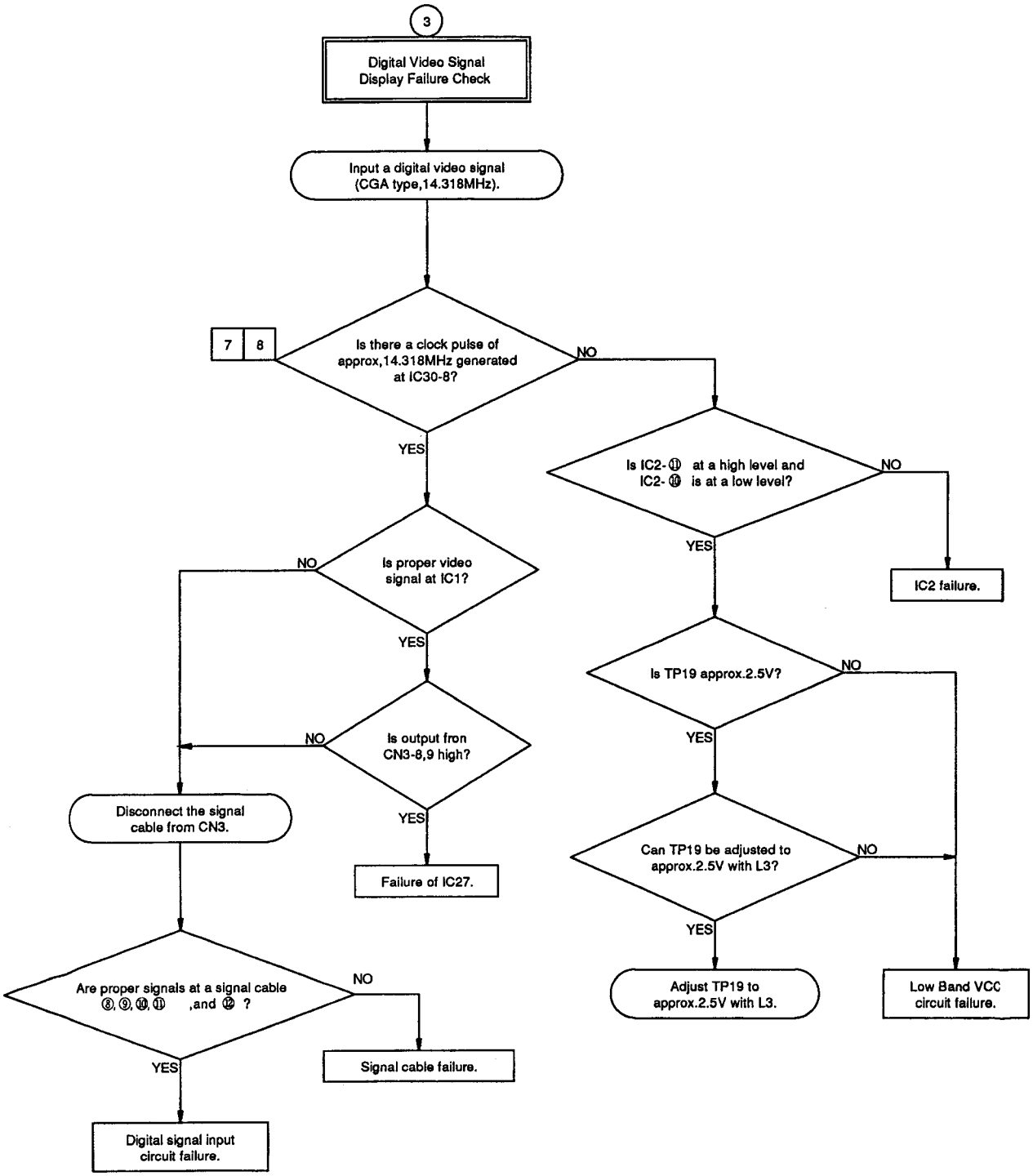
TROUBLESHOOTING CHART

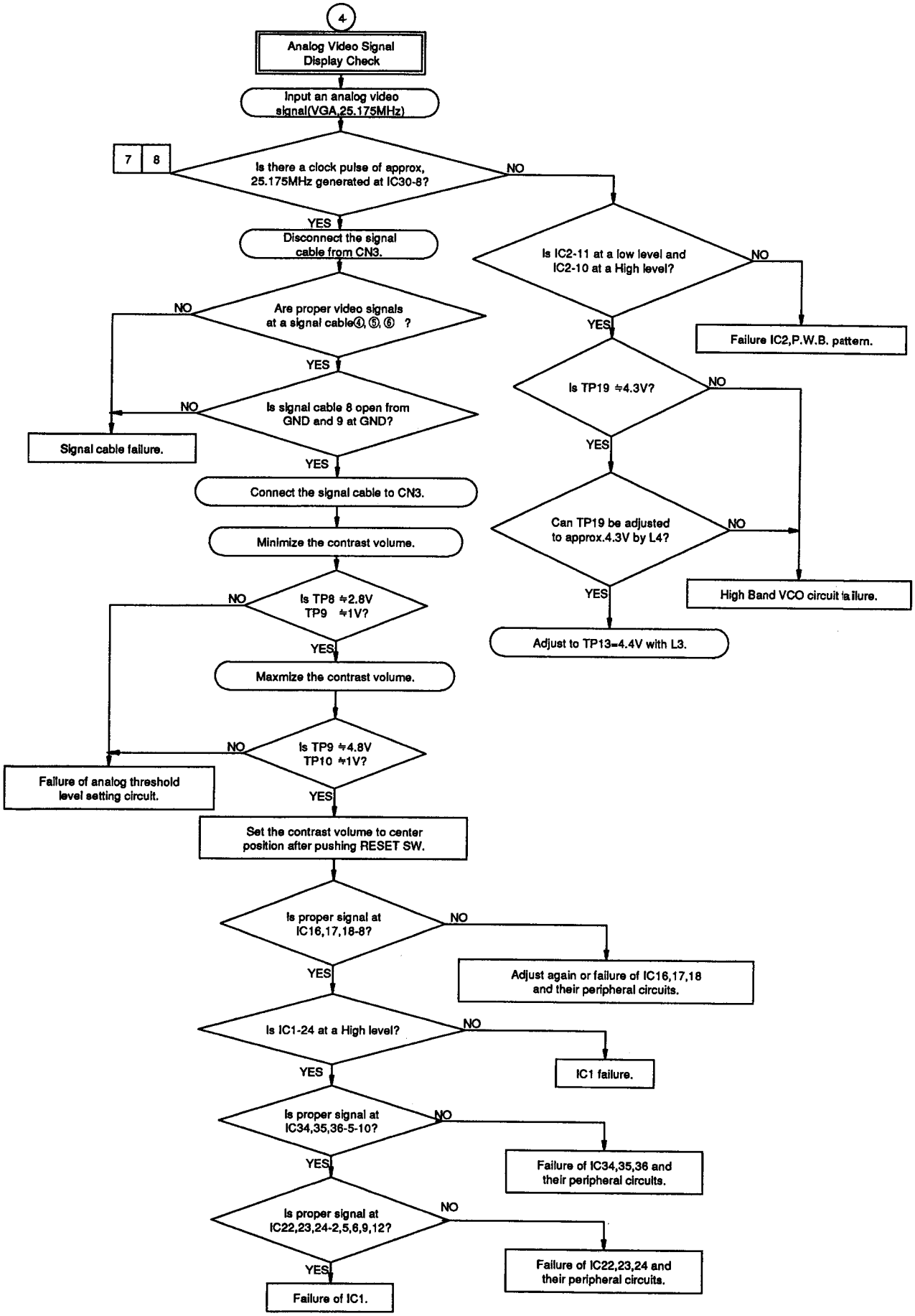


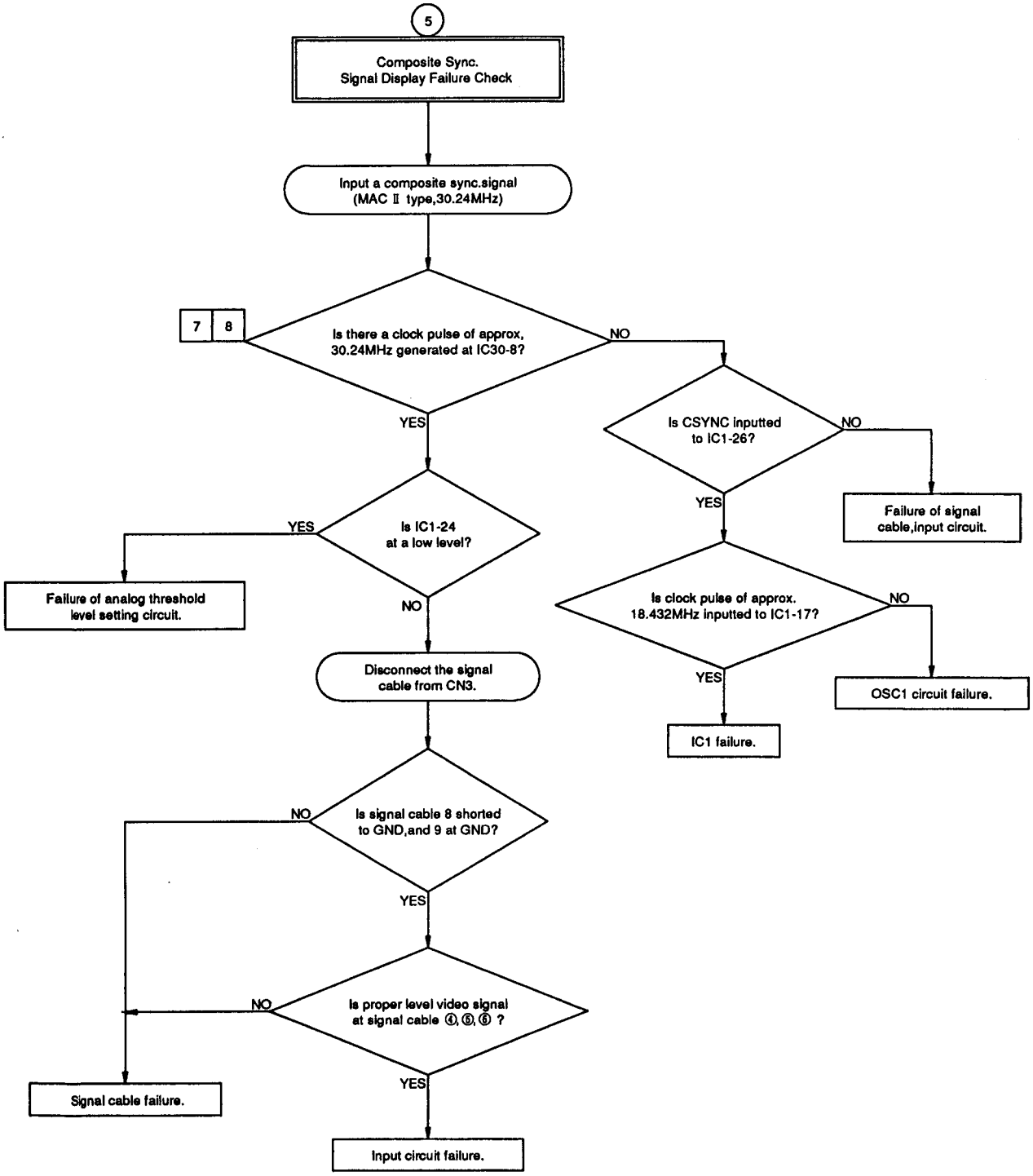

B
Input a composite video signal.(NTSC)
Is display normal?
NO
YES
Press the RESET SW on the panel.
Is normal display made by phase adjustment?
YES
NO
Input a composite video signal.(PAL)
Go to Composite Video Signal (NTSC) Check.⑥
Is display normal?
NO
YES
Press the RESET SW on the panel.
Is normal display made by phase adjustment?
YES
NO
Input a composite video signal.(SECAM)
Go to Composite Video Signal (PAL) Check. ⑦
Is display normal?
NO
YES
Press the RESET SW on the panel.
Is normal display made by phase adjustment?
YES
NO
Input a S-video signal.(NTSC)
Go to Composite Video Signal (SECAM) Check. ⑩
Is display normal?
NO
YES
Press the RESET SW on the panel.
Is normal display made by phase adjustment?
YES
NO
Go to S-Video Signal (NTSC) Check. ⑪
Go to Other Function Check. ⑧

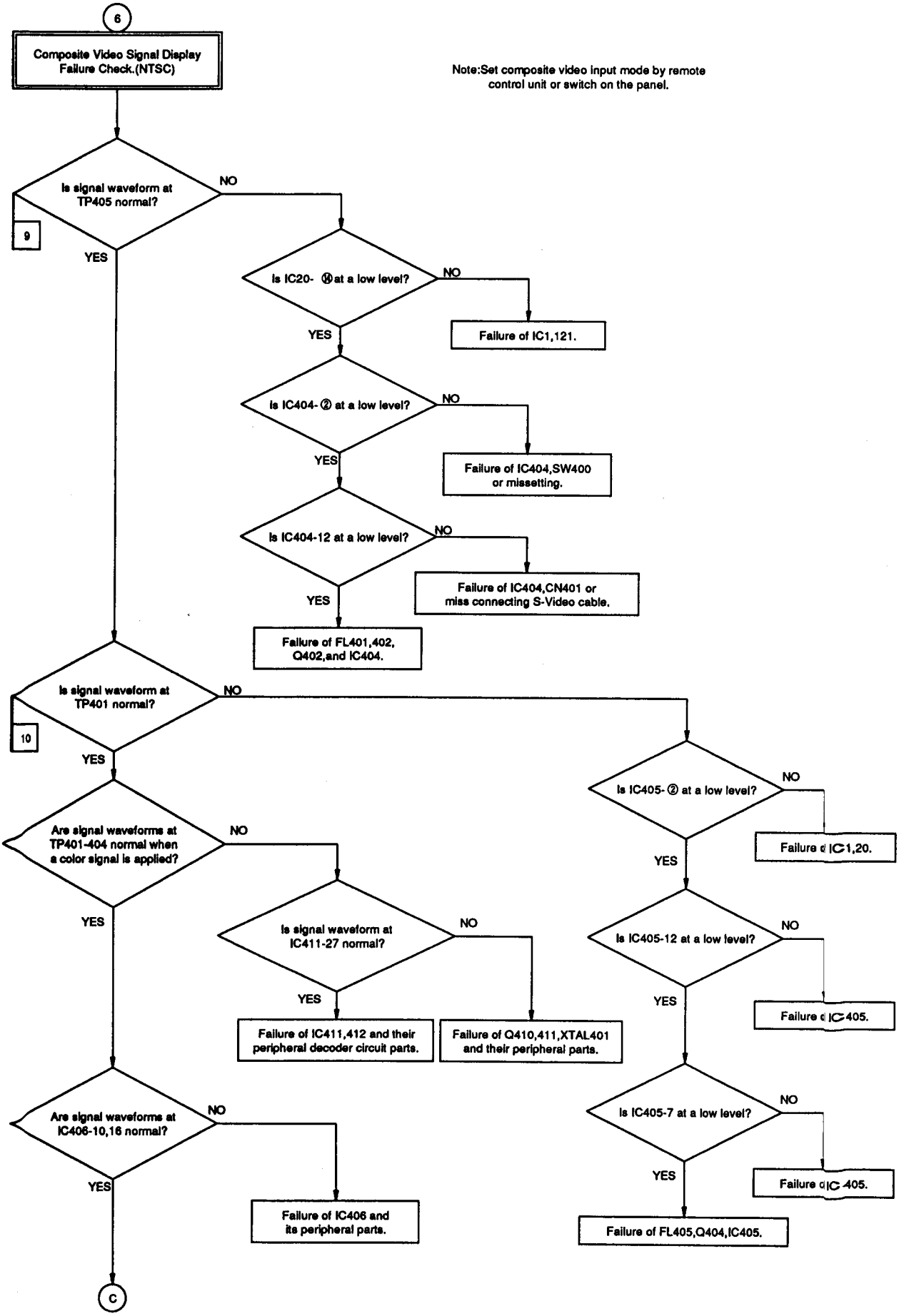

1
Power Sourse Circuit Check
Turn the power switch OFF
Is the voltage between CN1-3(3 is GND) approx 12V?
NO
AC adaptor failure.
YES
Turn the power switch ON
Is D208 cathode 12V?
NO
F1 failure.
YES
Is D209 cathode 12V?
NO
F2 failure.
YES
Is TP206(Vcpu) 5.1V?
NO
Is D211 anode 5.8V?
NO
Turn the power switch OFF.
Disconnect the LCD unit from CN4,5?
Turn the power switch ON.
Is TP206 5.1V?
YES
LCD unit failure.
NO
Failure of IC200 and its peripheral parts.
YES
D211 failure.
YES
Is TP208(Vc) 5V?
NO
D212,D213,D214 failure.
YES
Is TP207(VLCD) 5V?
NO
Turn the power switch OFF.
Disconnect the LCD unit from CN4,5?
Turn the power switch ON.
Is TP207(VLCD) 5V?
YES
LCD unit failure.
NO
Failure of IC200 and its peripheral parts.
YES
Is A-Vcc 5V?
NO
IC203,D216,217,218 failure.
YES
Is TP204 10V? Is TP205-10V?
NO
Failure of IC201 and its peripheral parts.
YES
Is CN200-① 11V?
NO
Disconnect the fan motor unit from CN200?
YES
Is fan motor operating?
YES
Is CN200-① 11V?
NO
D203,L214 failure.
NO
Fan motor unit failure.
Go to Other Function Check.⑧

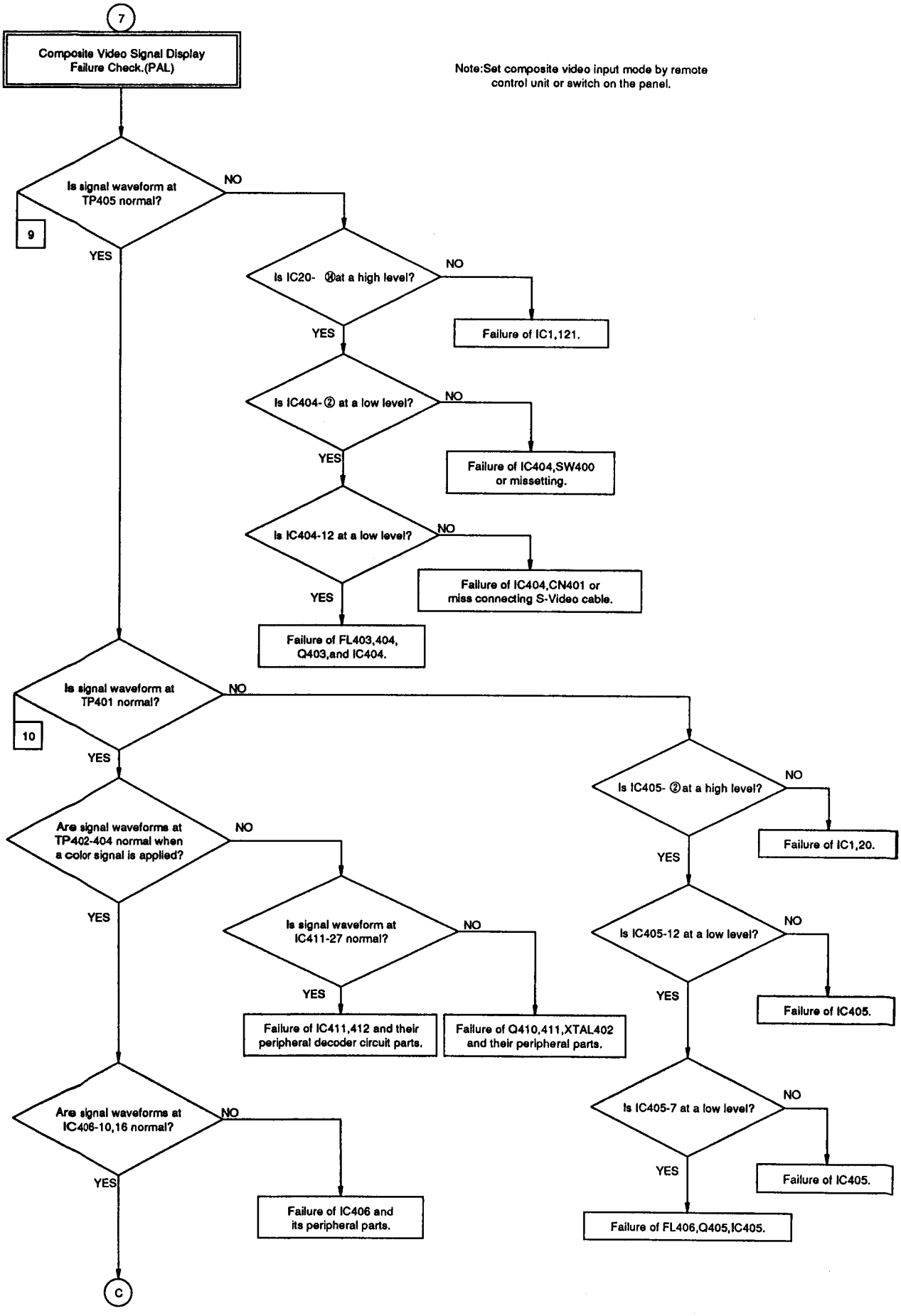

2
LCD Display Failure Check.
Input a digital video signal. (CGA,14.318MHz)
5
Is there a clock pulse of approx. 18.432MHz generated at IC1-17?
NO
Failure of OCS1.
YES
Is there a clock pulse of approx. 14.318MHz generated at IC30-8?
NO
YES
6 7 8
Is Hsync input to IC1-26 and Vsync to IC1-25?
NO
Failure of Hsync or Vsync input circuit or signal cable failure.
YES
7 8
Are signals at IC1-84, 86,and 87 normal?
NO
Disconnect the panel.
YES
Are signals at IC1-84, 86,and 87 normal?
NO
YES
Failure of panel.
Failure of IC1.
Is input signal to IC1-25 and output signal from IC1-11 have the same frequency?
NO
YES
Is frequency 61.326MHz on IC1-9 ?
NO
YES
Is the output from IC1-8 and IC1-10 high?
NO
YES
Failure of IC1 and its peripheral circuits.
Is the output from IC1-7 high?
NO
YES
Are the proper signal input to IC1-2-5,156-159?
NO
YES
Failure of signal line between IC1 and IC2.
Is IC2-11 at a high level and IC2-10 at a low level?
NO
YES
Go to MPU Check.
VCD circuit failure or pattern failure.
Are proper signal inputted to IC34,35,36-3-10?
NO
Failure of video input circuit.
YES
Abnormal display.
Failure of IC,1,2,3,4,5,8,9
P.W.B.pattern open or short,soldering.

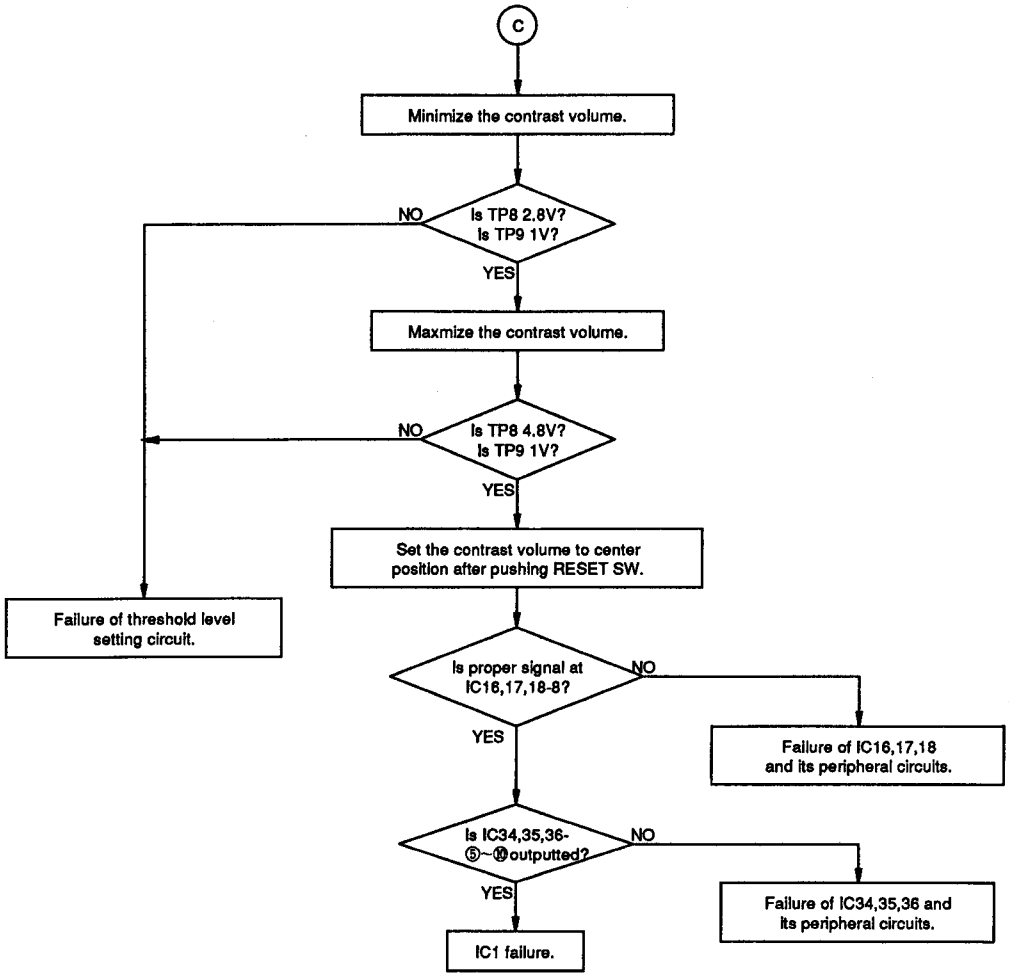

3
Digital Video Signal Display Failure Check
Input a digital video signal (CGA type,14.318MHz).
7
8
Is there a clock pulse of approx,14.318MHz generated at IC30-8?
NO
YES
Is IC2-⑪ at a high level and IC2-⑩ is at a low level?
NO
YES
IC2 failure.
Is proper video signal at IC1?
NO
YES
Is TP19 approx.2.5V?
NO
YES
Is output fron CN3-8,9 high?
NO
YES
Disconnect the signal cable from CN3.
Failure of IC27.
Can TP19 be adjusted to approx.2.5V with L3?
NO
YES
Are proper signals at a signal cable ⑧, ⑨, ⑩, ⑪ ,and ⑫ ?
NO
YES
Adjust TP19 to approx.2.5V with L3.
Low Band VCC circuit failure.
Signal cable failure.
Digital signal input circuit failure.

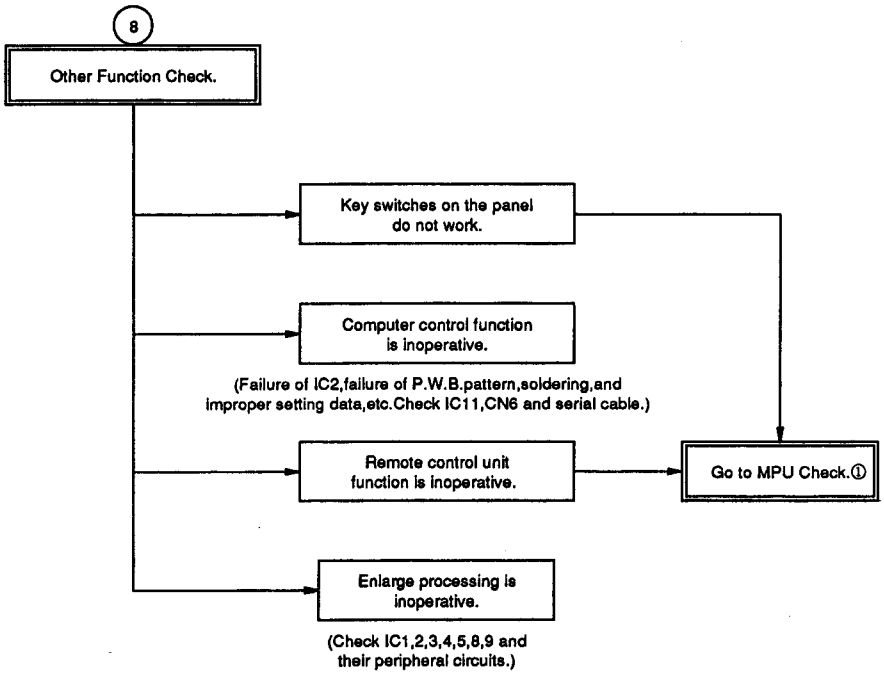

4
Analog Video Signal Display Check
Input an analog video signal(VGA,25.175MHz)
7
8
Is there a clock pulse of approx, 25.175MHz generated at IC30-8?
NO
YES
Disconnect the signal cable from CN3.
Are proper video signals at a signal cable④,⑤,⑥ ?
NO
YES
Is signal cable 8 open from GND and 9 at GND?
NO
Signal cable failure.
YES
Connect the signal cable to CN3.
Minimize the contrast volume.
Is TP8 ≒2.8V TP9 ≒1V?
NO
YES
Maxmize the contrast volume.
Is TP9 ≒4.8V TP10 ≒1V?
NO
Failure of analog threshold level setting circuit.
YES
Set the contrast volume to center position after pushing RESET SW.
Is proper signal at IC16,17,18-8?
NO
Adjust again or failure of IC16,17,18 and their peripheral circuits.
YES
Is IC1-24 at a High level?
NO
IC1 failure.
YES
Is proper signal at IC34,35,36-5-10?
NO
Failure of IC34,35,36 and their peripheral circuits.
YES
Is proper signal at IC22,23,24-2,5,6,9,12?
NO
Failure of IC22,23,24 and their peripheral circuits.
YES
Failure of IC1.
Is IC2-11 at a low level and IC2-10 at a High level?
NO
Failure IC2,P.W.B. pattern.
YES
Is TP19 ≒4.3V?
NO
YES
Can TP19 be adjusted to approx.4.3V by L4?
NO
High Band VCO circuit failure.
YES
Adjust to TP13=4.4V with L3.

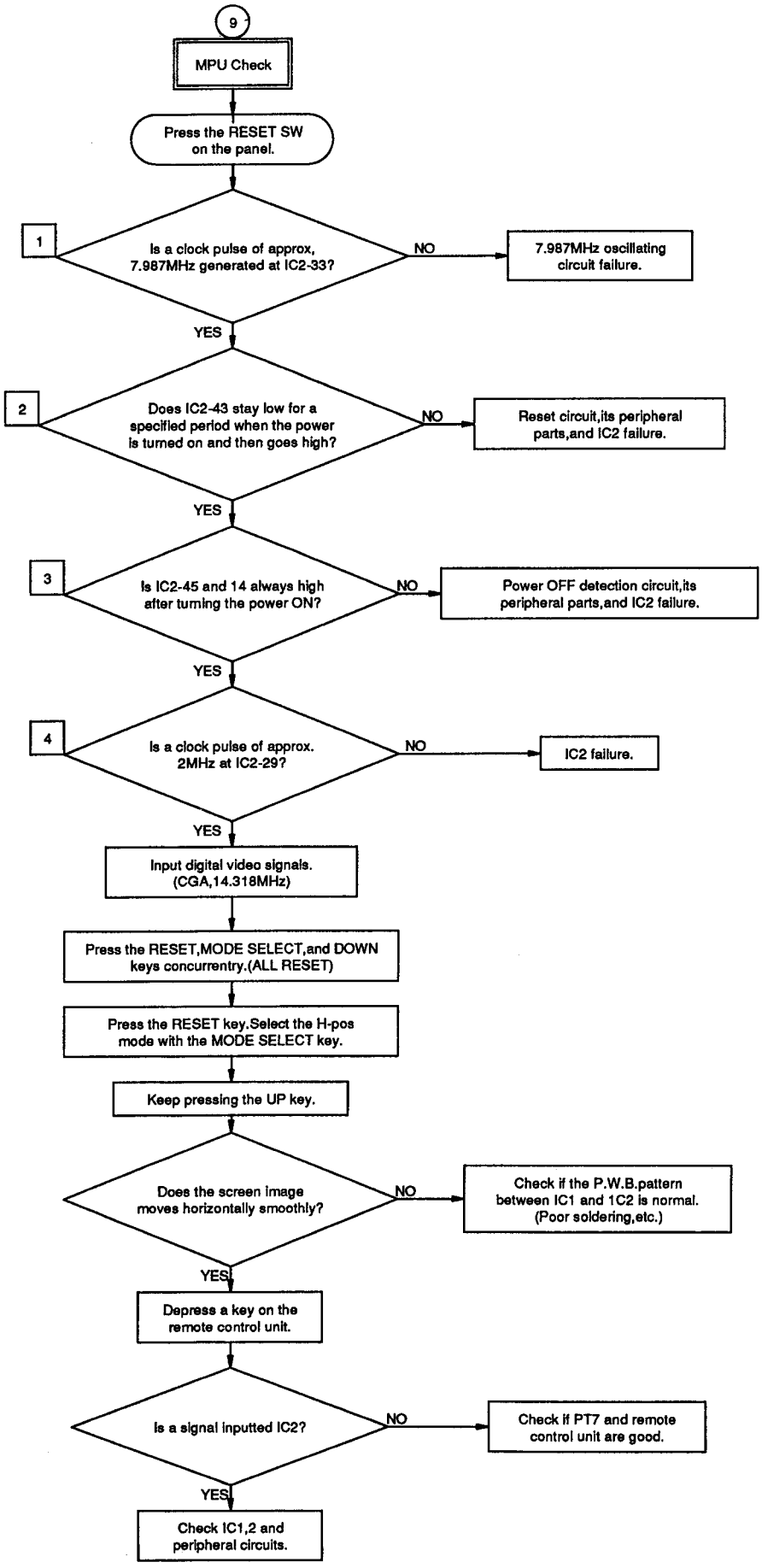

5
Composite Sync.
Signal Display Failure Check
Input a composite sync.signal
(MAC II type,30.24MHz)
7
8
Is there a clock pulse of approx,
30.24MHz generated at IC30-8?
NO
YES
Is CSYNC inputted
to IC1-26?
NO
YES
Failure of signal
cable,input circuit.
YES
Is IC1-24
at a low level?
Failure of analog threshold
level setting circuit.
NO
Is clock pulse of approx.
18.432MHz inputted to IC1-17?
NO
YES
OSC1 circuit failure.
IC1 failure.
Disconnect the signal
cable from CN3.
NO
Is signal cable 8 shorted
to GND,and 9 at GND?
YES
NO
Is proper level video signal
at signal cable ④,⑤,⑥ ?
YES
Signal cable failure.
Input circuit failure.

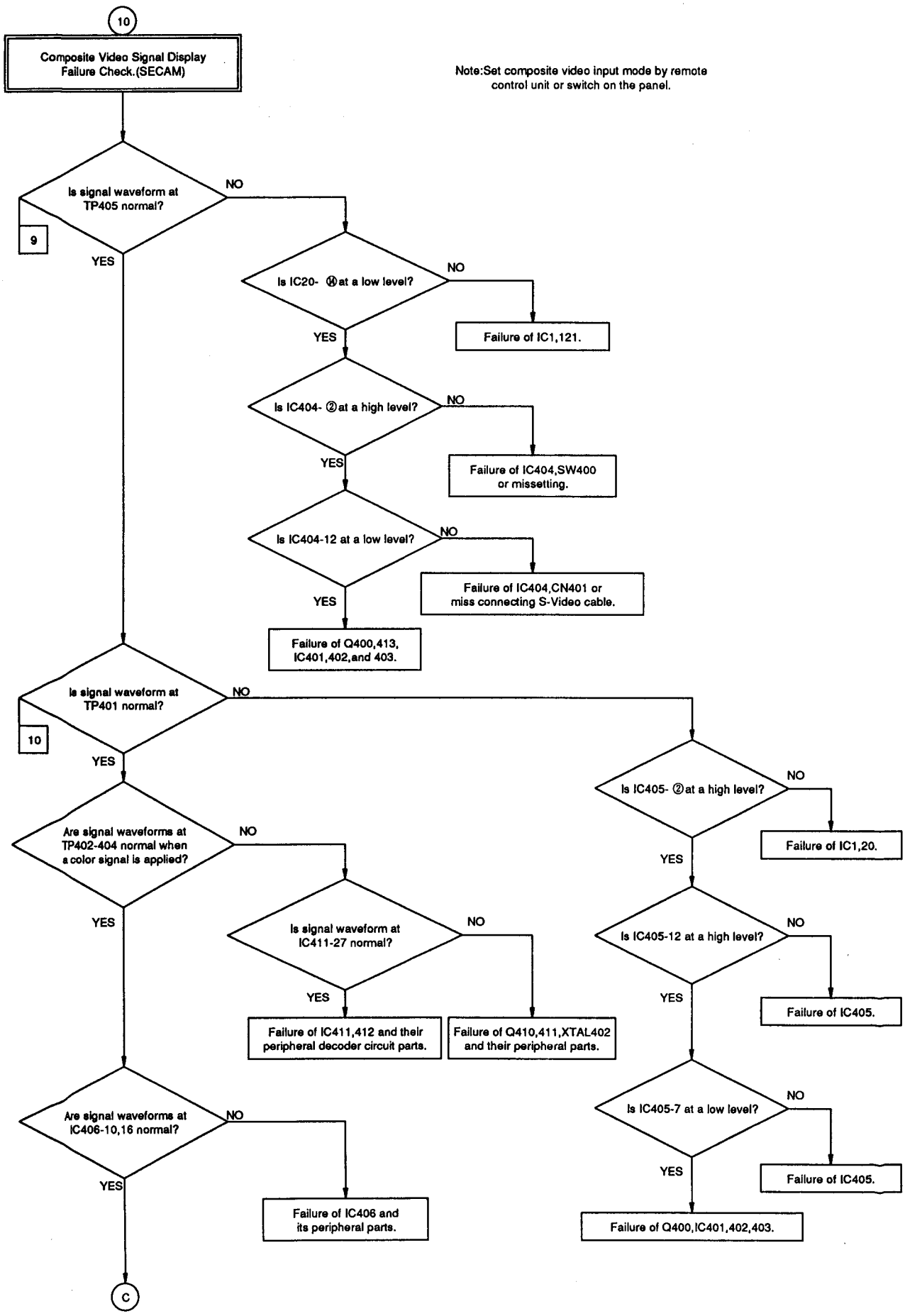

6
Composite Video Signal Display Failure Check.(NTSC)
Note:Set composite video input mode by remote control unit or switch on the panel.
Is signal waveform at TP405 normal?
NO
YES
9
Is IC20- ⑭at a low level?
NO
YES
Failure of IC1,121.
Is IC404-② at a low level?
NO
YES
Failure of IC404,SW400 or missetting.
Is IC404-12 at a low level?
NO
YES
Failure of IC404,CN401 or miss connecting S-Video cable.
Failure of FL401,402, Q402,and IC404.
Is signal waveform at TP401 normal?
NO
YES
10
Are signal waveforms at TP401-404 normal when a color signal is applied?
NO
YES
Is signal waveform at IC411-27 normal?
NO
YES
Failure of IC411,412 and their peripheral decoder circuit parts.
Failure of Q410,411,XTAL401 and their peripheral parts.
Are signal waveforms at IC406-10,16 normal?
NO
YES
Failure of IC406 and its peripheral parts.
C
Is IC405-② at a low level?
NO
YES
Failure of IC1,20.
Is IC405-12 at a low level?
NO
YES
Failure of IC405.
Is IC405-7 at a low level?
NO
YES
Failure of IC405.
Failure of FL405,Q404,IC405.

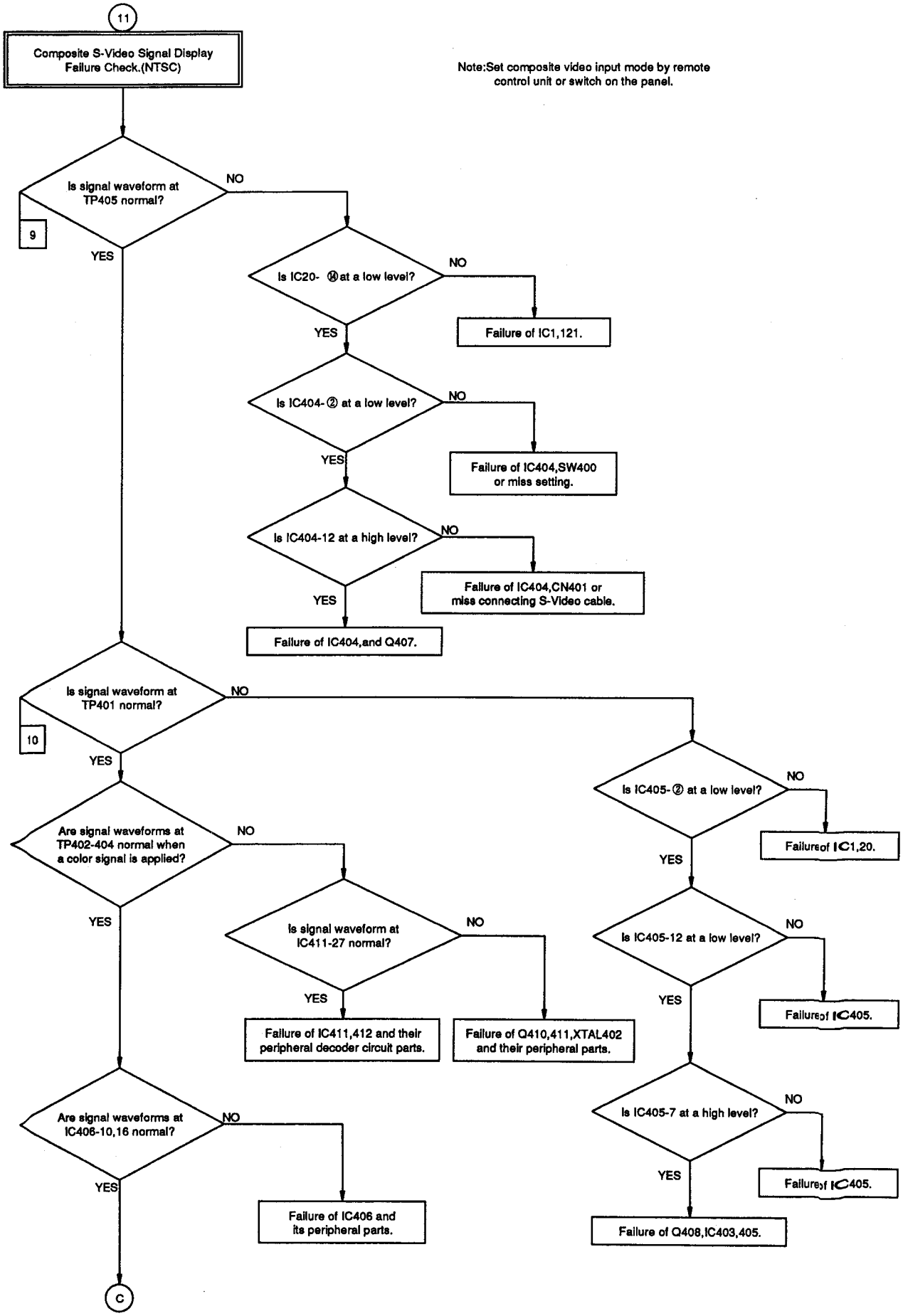

7
Composite Video Signal Display Failure Check.(PAL)
Note:Set composite video input mode by remote control unit or switch on the panel.
Is signal waveform at TP405 normal?
NO
YES
9
Is IC20- ㉔at a high level?
NO
Failure of IC1,121.
YES
Is IC404-② at a low level?
NO
Failure of IC404,SW400 or missetting.
YES
Is IC404-12 at a low level?
NO
Failure of IC404,CN401 or miss connecting S-Video cable.
YES
Failure of FL403,404, Q403,and IC404.
Is signal waveform at TP401 normal?
NO
10
YES
Are signal waveforms at TP402-404 normal when a color signal is applied?
NO
YES
Is signal waveform at IC411-27 normal?
NO
YES
Failure of IC411,412 and their peripheral decoder circuit parts.
Failure of Q410,411,XTAL402 and their peripheral parts.
Are signal waveforms at IC406-10,16 normal?
NO
YES
Failure of IC406 and its peripheral parts.
C
Is IC405- ②at a high level?
NO
Failure of IC1,20.
YES
Is IC405-12 at a low level?
NO
YES
Failure of IC405.
Is IC405-7 at a low level?
NO
YES
Failure of IC405.
Failure of FL406,Q405,IC405.


C
Minimize the contrast volume.
NO
Is TP8 2.8V?
Is TP9 1V?
YES
Maxmize the contrast volume.
NO
Is TP8 4.8V?
Is TP9 1V?
YES
Set the contrast volume to center position after pushing RESET SW.
Failure of threshold level setting circuit.
Is proper signal at IC16,17,18-8?
NO
YES
Failure of IC16,17,18 and its peripheral circuits.
Is IC34,35,36-⑤~⑫outputted?
NO
YES
Failure of IC34,35,36 and its peripheral circuits.
IC1 failure.


8
Other Function Check.
Key switches on the panel do not work.
Computer control function is inoperative.
(Failure of IC2,failure of P.W.B.pattern,soldering,and improper setting data,etc.Check IC11,CN6 and serial cable.)
Remote control unit function is inoperative.
Go to MPU Check.①
Enlarge processing is inoperative.
(Check IC1,2,3,4,5,8,9 and their peripheral circuits.)


9
MPU Check
Press the RESET SW on the panel.
1
Is a clock pulse of approx, 7.987MHz generated at IC2-33?
NO
7.987MHz oscillating circuit failure.
YES
2
Does IC2-43 stay low for a specified period when the power is turned on and then goes high?
NO
Reset circuit,its peripheral parts,and IC2 failure.
YES
3
Is IC2-45 and 14 always high after turning the power ON?
NO
Power OFF detection circuit,its peripheral parts,and IC2 failure.
YES
4
Is a clock pulse of approx. 2MHz at IC2-29?
NO
IC2 failure.
YES
Input digital video signals. (CGA,14.318MHz)
Press the RESET,MODE SELECT,and DOWN keys concurrentry.(ALL RESET)
Press the RESET key.Select the H-pos mode with the MODE SELECT key.
Keep pressing the UP key.
Does the screen image moves horizontally smoothly?
NO
Check if the P.W.B.pattern between IC1 and 1C2 is normal. (Poor soldering,etc.)
YES
Depress a key on the remote control unit.
Is a signal inputted IC2?
NO
Check if PT7 and remote control unit are good.
YES
Check IC1,2 and peripheral circuits.


10
Composite Video Signal Display Failure Check.(SECAM)
Note:Set composite video input mode by remote control unit or switch on the panel.
Is signal waveform at TP405 normal?
NO
9
YES
Is IC20- ⑭at a low level?
NO
Failure of IC1,121.
YES
Is IC404- ②at a high level?
NO
Failure of IC404,SW400 or missetting.
YES
Is IC404-12 at a low level?
NO
Failure of IC404,CN401 or miss connecting S-Video cable.
YES
Failure of Q400,413, IC401,402,and 403.
Is signal waveform at TP401 normal?
NO
10
YES
Are signal waveforms at TP402-404 normal when a color signal is applied?
NO
YES
Is signal waveform at IC411-27 normal?
NO
YES
Failure of IC411,412 and their peripheral decoder circuit parts.
Failure of Q410,411,XTAL402 and their peripheral parts.
Are signal waveforms at IC406-10,16 normal?
NO
YES
Failure of IC406 and its peripheral parts.
C
Is IC405- ②at a high level?
NO
Failure of IC1,20.
YES
Is IC405-12 at a high level?
NO
Failure of IC405.
YES
Is IC405-7 at a low level?
NO
Failure of IC405.
YES
Failure of Q400,IC401,402,403.


11
Composite S-Video Signal Display Failure Check.(NTSC)
Note:Set composite video input mode by remote control unit or switch on the panel.
Is signal waveform at TP405 normal?
NO
YES
9
Is IC20- ⑭at a low level?
NO
Failure of IC1,121.
YES
Is IC404-② at a low level?
NO
Failure of IC404,SW400 or miss setting.
YES
Is IC404-12 at a high level?
NO
Failure of IC404,CN401 or miss connecting S-Video cable.
YES
Failure of IC404,and Q407.
Is signal waveform at TP401 normal?
NO
10
YES
Are signal waveforms at TP402-404 normal when a color signal is applied?
NO
YES
Is signal waveform at IC411-27 normal?
NO
YES
Failure of IC411,412 and their peripheral decoder circuit parts.
Failure of Q410,411,XTAL402 and their peripheral parts.
Are signal waveforms at IC406-10,16 normal?
NO
YES
Failure of IC406 and its peripheral parts.
C
Is IC405-② at a low level?
NO
Failureof IC1,20.
YES
Is IC405-12 at a low level?
NO
Failureof IC405.
YES
Is IC405-7 at a high level?
NO
Failureof IC405.
YES
Failure of Q408,IC403,405.

[1] IC2-㉝
1V/div
50ns/div

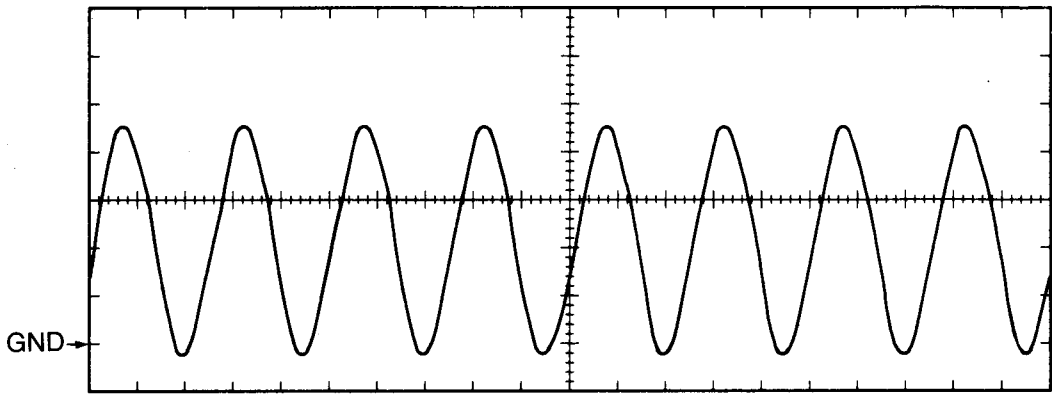


Fig. 28

[2] V_{cpu} ··· 2V/div
IC2-㊸ ··· 2V/div
5ms/div

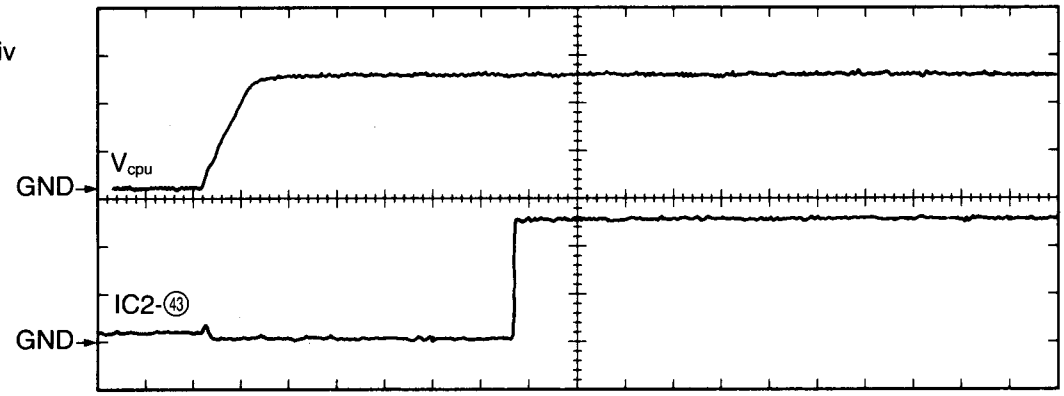


Fig. 29

[3] V_c ··· 2V/div
IC2-㊺ or ⑭
2V/div
10ms/div

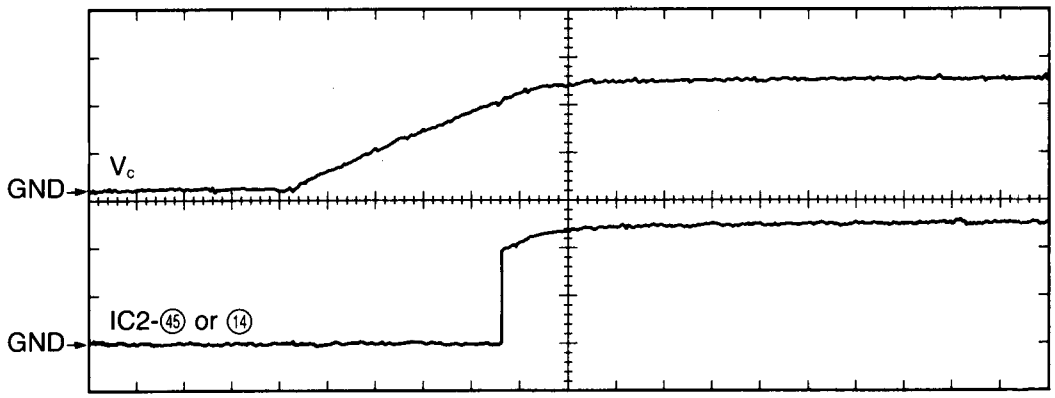


Fig. 30

[4] IC2-㉙ ··· 1V/div
100ns/div

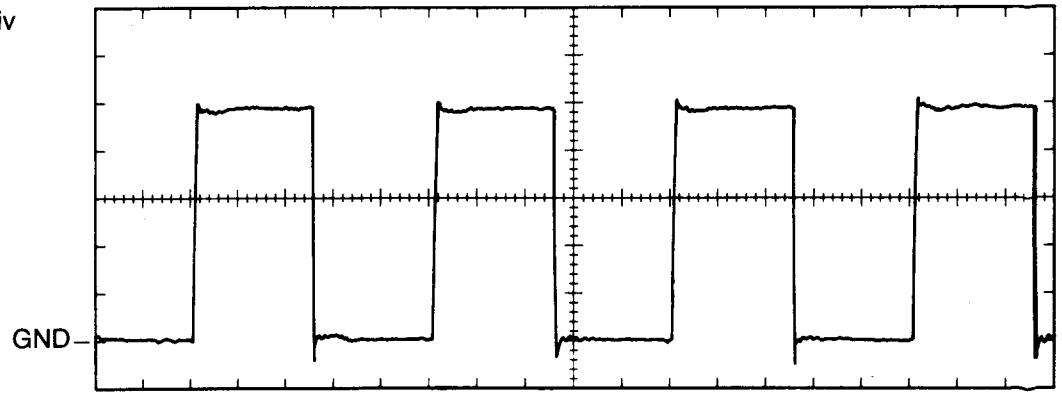


Fig. 31

[5] IC1-⑰
1V/div
10ns/div

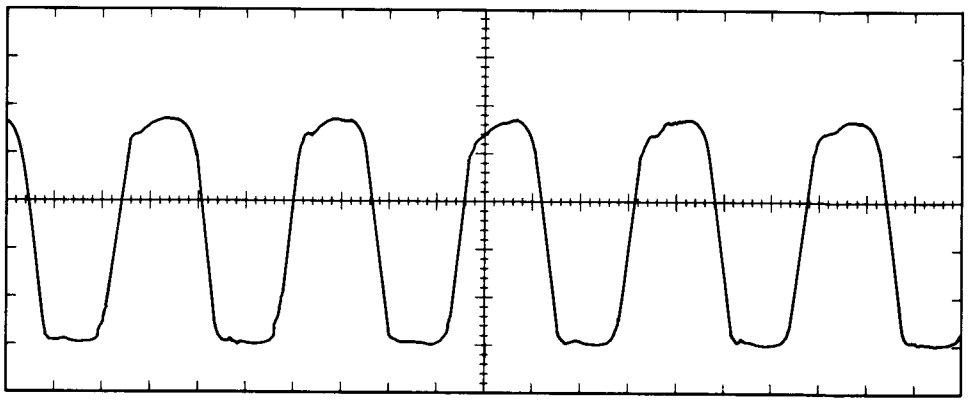


Fig. 32

[6] IC1-㉕ ··· 2V/div
500ns/div

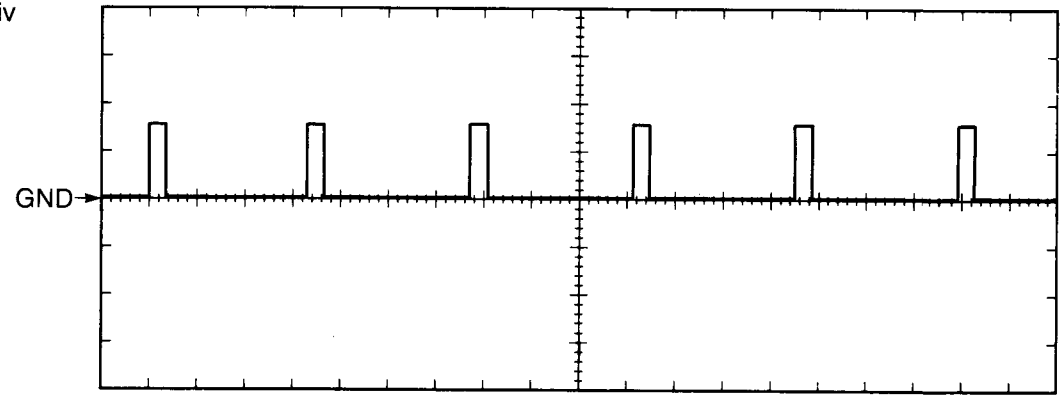


Fig. 33

[7] IC1-㉕ ··· 2V/div
IC1-㉓ ··· 2V/div
50ns/div

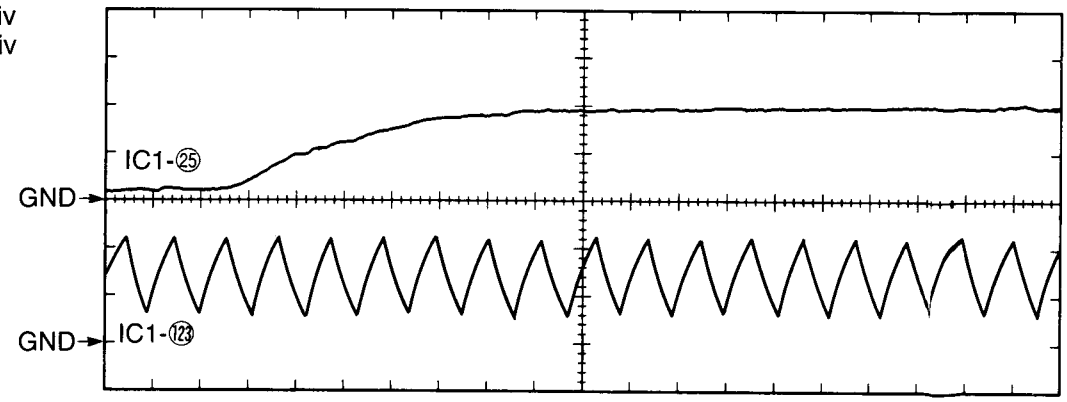


Fig. 34

[8] IC1-㉖ ··· 2V/div
IC1-㉓ ··· 2V/div
20ns/div

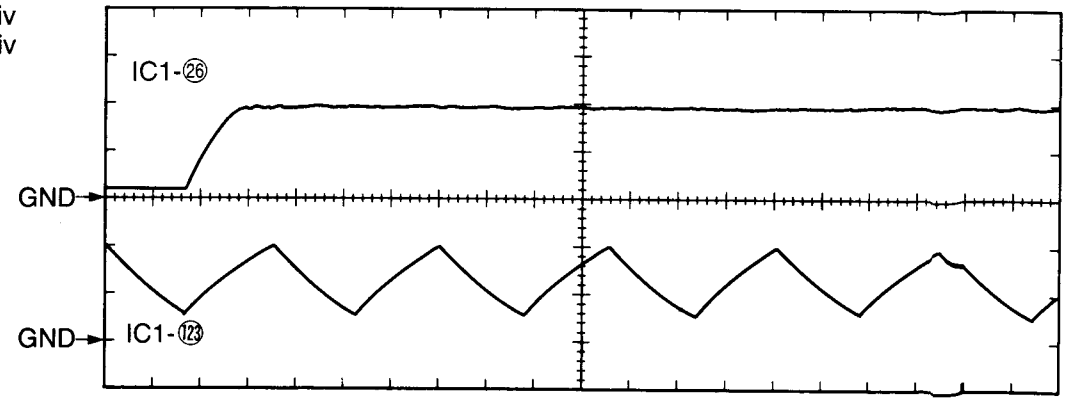


Fig. 35

9 TP405
0.1V/div
20μsec/div

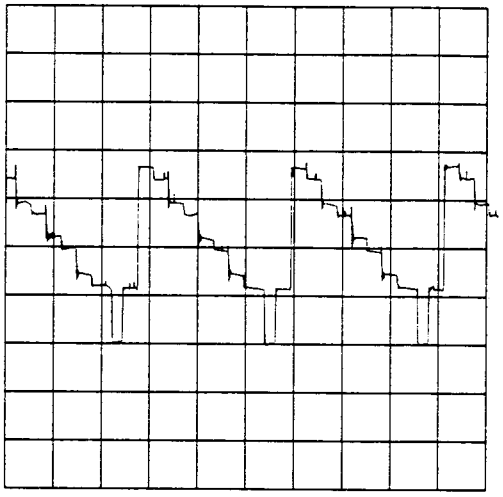


Fig. 36

10 TP401
0.1V/div
20μsec/div

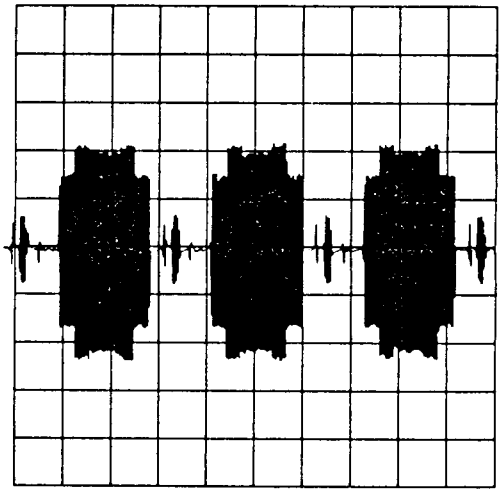


Fig. 37

11 CN400-①
0.2V/div
20μsec/div

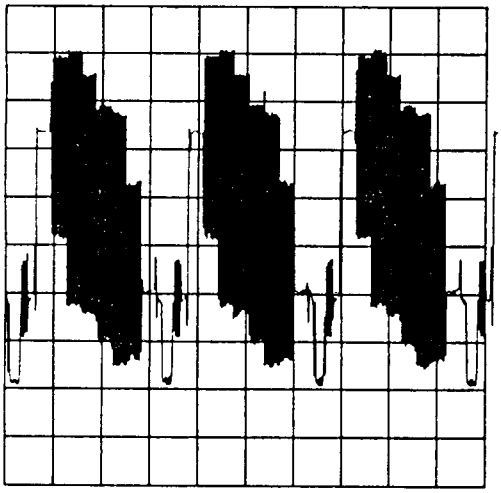


Fig. 38

12 CN403-①
0.2V/div
20μsec/div
(Input a 100% color bar signal)

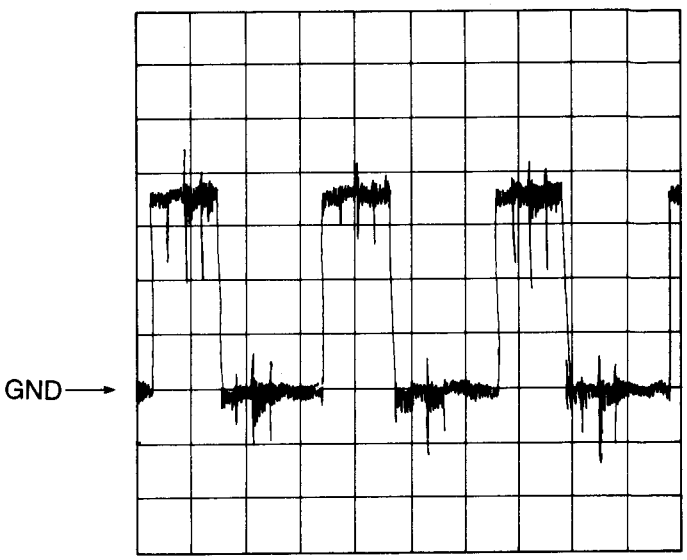


Fig. 39

13 CN403-③
0.2V/div
20μsec/div
(Input a 100% color bar signal)

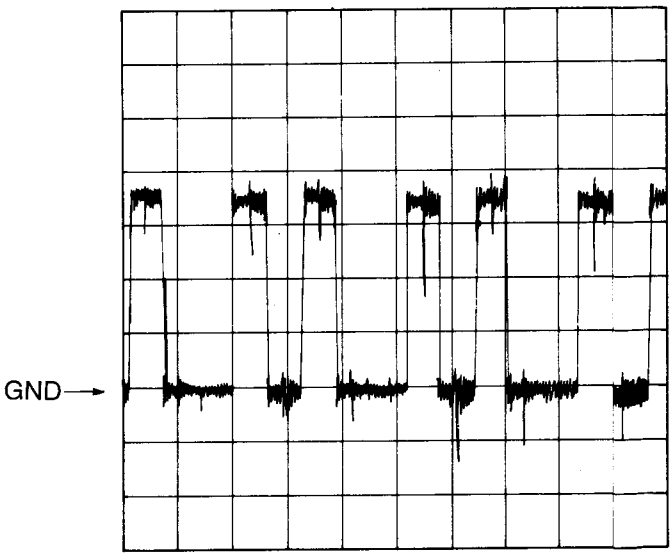
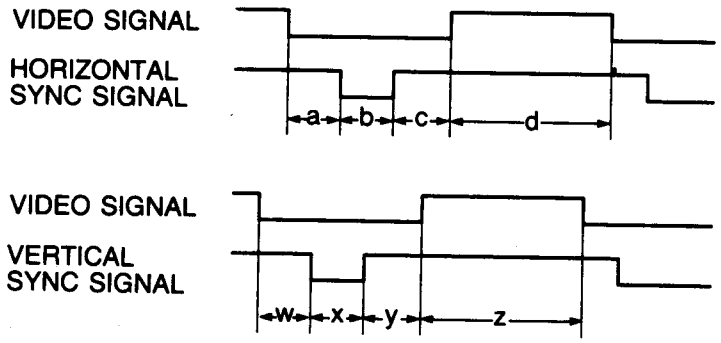
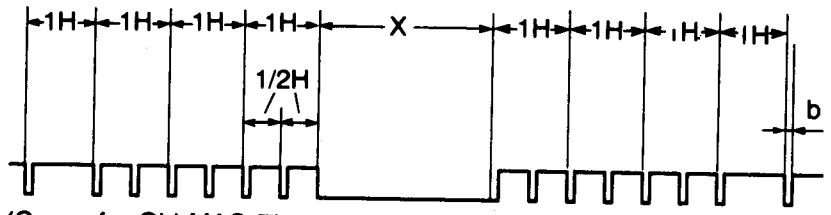


Fig. 40

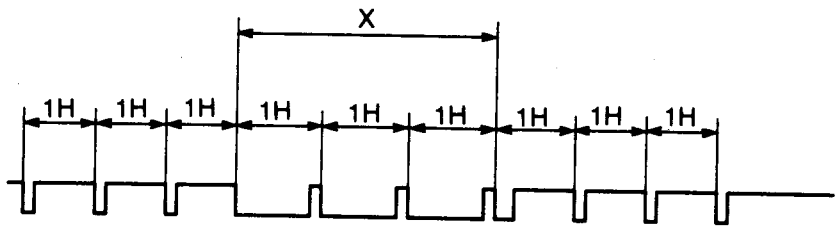
TIMING CHART

■ The following timing charts are applied to Tables 6, 7 and 8.





(Csync for Old MAC II)



(Csync for New MAC II)

Fig. 41

Table 6

			1	2	3	4	5	6	7	8
			IBM				IBM		IBM	IBM
			VGA	VGA/MCGA		VGA	EGA		CGA	MDA
							Text 40chr	80chr/Graphic	40chr, Graphic/80chr	
			720 dot	640 dot			640 dot		640 dot	720 dot
			400 line	400 line	350 line	480 line	350 line		200 line	350 line
Hsync	FRONT PORCH a	dot	18	16			−7	−3	95/103	9
	SYNC b	dot	108	96			80	80	64/ 48	144
	BACK PORCH c	dot	54	48			39	27	113/121	9
	VIDEO PERIOD d	dot	720	640			640	640	640	720
	1H (a+b+c+d)	dot	900	800			752	744	912	882
		μs	31.777417	31.777557			46.256997	45.764901	63.696047	54.253552
	1 dot	ns	35.308241	39.721946			61.511964	61.511964	69.842157	61.511964
	1/H	KHz	31.468906	31.468881			21.618351	21.850806	15.699561	18.432197
	1/dot	MHz	28.322	25.175			16.257		14.318	16.257
	LEVEL		TTL	TTL			TTL		TTL	TTL
	SYNC POLARITY	+/−	−	−	+	−	+		+	+
Vsync	FRONT PORCH W	H	13	13	38	11	1		25	0
	SYNC X	H	2	2	2	2	13		3	16
	BACK PORCH Y	H	34	34	59	32	2		34	4
	VIDEO PERIOD Z	H	400	400	350	480	350		200	350
	1V (W+X+Y+Z)	H	449	449	449	525	366	366	262	370
		ms	14.26806	14.268123	14.268123	16.683217	16.930061	16.749954	16.688364	20.073814
	1/V	Hz	70.00	70.00	70.00	59.94	59.07	59.70	59.92	49.82
	LEVEL		TTL	TTL	TTL	TTL	TTL		TTL	TTL
	SYNC	+/−	+	+	−	−	−		+	−
VIDEO	LEVEL		0.7Vp-p MAX 75Ω Load				TTL		TTL	TTL
	TYPE		R, G, B				R, G, B r, g, b		R, G, B I	Mono Video I
REMARKS									• AUTO SETUP shall be set in the 40chr-graphic mode.	

Table 7

			9	10	11	12	13	14	15	
			Hercules		Hercules		APPLE		AT & T	
			HGC/HGC+		Incolor		MAC II Video Card	MAC +/SE	6300WGS	
			Text	Graphic	Text	Graphic				
			720 dot		720 dot		640 dot	512 dot	640 dot	
			350 line	348 line	350 line	348 line	480 line	342 line	350 line	400 line
Hsync	FRONT PORCH a	dot	7	−2	7	−2	64	15	78	
	SYNC b	dot	135	112	135	112	64	64	104	
	BACK PORCH c	dot	20	34	20	34	96	113	106	
	VIDEO PERIOD d	dot	720	720	720	720	640	512	640	
	1H (a+b+c+d)	dot	882	864	882	864	864	704	928	
		μs	55.125	54.000	46.42105	45.473684	28.571429	44.934641	38.666667	
	1 dot	ns	62.500		52.631579		33.068783	63.827614	41.666667	
	1/H	KHz	18.1406	18.5185	21.54195	21.990741	35.000	22.254545	25.862069	
	1/dot	MHz	16.000		19.000		30.240	15.6672	24.000	
	LEVEL		TTL		TTL		TTL	TTL	TTL	
	SYNC POLARITY	+/−	+		+		−	+	+	
Vsync	FRONT PORCH W	H	0		0		3	0	25	0
	SYNC X	H	16		16		3	4	16	16
	BACK PORCH Y	H	4	6	4	6	39	24	41	16
	VIDEO PERIOD Z	H	350	348	350	348	480	342	350	400
	1V (W+X+Y+Z)	H	370	370	370	370	525	370	432	
		ms	20.39625	19.980	17.175789	16.825263	15.000	16.625817	16.704	
	1/V	Hz	49.03	50.05	58.22	59.43	66.68	60.15	59.87	
	LEVEL		TTL		TTL		TTL	TTL	TTL	
	SYNC	+/−	−		−		−	+	+	
VIDEO	LEVEL		TTL		TTL		1.0Vp-p MAX 75Ω Load	TTL	TTL	
	TYPE		Mono Video I		R, G, B r, g, b		R, G, B	Mono Video I	R, G, B I	
REMARKS							● Synchronous signal is Csync.	● A/D converter adaptor is required.	● Signal cable is required. ● Operates in the 400 line mode also with 350 line signal input.	

Table 8

			16	17	18	19	20	21	22	23
			APPLE	NEC		SHARP	APPLE	APPLE		
			APPLE IIe/ +/c/GS	PC-9801		AX-286 AX-386	MAC LC	MAC LC		
			560 dot	640 dot		640 dot	640 dot	512 dot		
			192 line	200 line	400 line	480 line	480 line	384 line		
Hsync	FRONT PORCH a	dot	109	59	59	18	78	10		
	SYNC b	dot	170	64	64	88	62	31		
	BACK PORCH c	dot	73	133	85	86	116	87		
	VIDEO PERIOD d	dot	560	640	640	640	640	512		
	1H (a+b+c+d)	dot	912	896	848	832	896	640		
		μs	63.696047	62.578572	40.280060	33.048659	28.595	40.849412		
	1 dot	ns	69.842157	69.842157	47.500071	39.721946	31.914063	63.827206		
	1/H	KHz	15.699561	15.979911	24.826179	30.258	34.971149	24.4801		
	1/dot	MHz	14.318	14.318	21.0526	25.175	31.334149	15.6673		
	LEVEL		TTL	TTL		TTL	TTL	TTL		
	SYNC POLARITY	+/−	+	−		+	−	−		
Vsync	FRONT PORCH W	H	33	15	7	4	33	1		
	SYNC X	H	3	8	8	12	3	3		
	BACK PORCH Y	H	34	37	25	5	39	19		
	VIDEO PERIOD Z	H	192	200	400	480	480	384		
	1V (W+X+Y+Z)	H	262	260	440	501	525	407		
		ms	16.688364	16.270429	17.723227	16.557379	15.000	16.62571		
	1/V	Hz	59.92	61.46	56.42	60 40	66.67	60.1478		
	LEVEL		TTL	TTL		TTL	TTL	TTL		
	SYNC	+/−	+	−		−	−	+		
VIDEO	LEVEL		TTL	TTL		TTL	0.7Vp-p MAX 75Ω Load	0.7Vp-p MAX 75Ω Load		
	TYPE		R, G, B I	R, G, B		R, G, B r, g, b	R, G, B	R, G, B		
REMARKS			Composite signal-responsive A/D converter adaptor is separately required. Shall be operated in the IBM CGA mode.	Signal cable is required.			Synchronous signal is Csync.	Synchronous Signal is. Csync.		

CIRCUIT DIAGRAM & P.W.B.

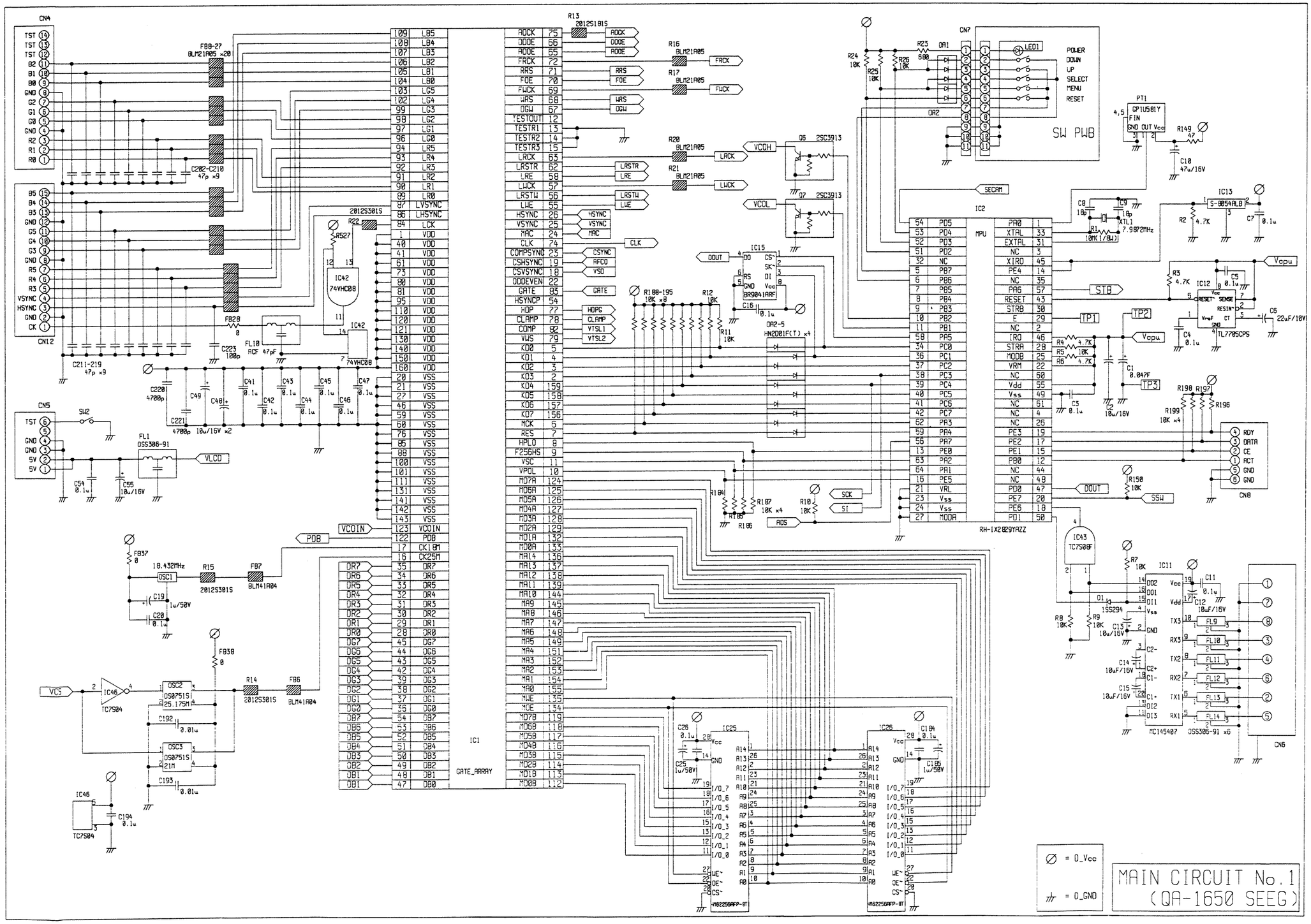


Fig. 42 CIRCUIT DIAGRAM (MAIN-CIRCUIT 1)

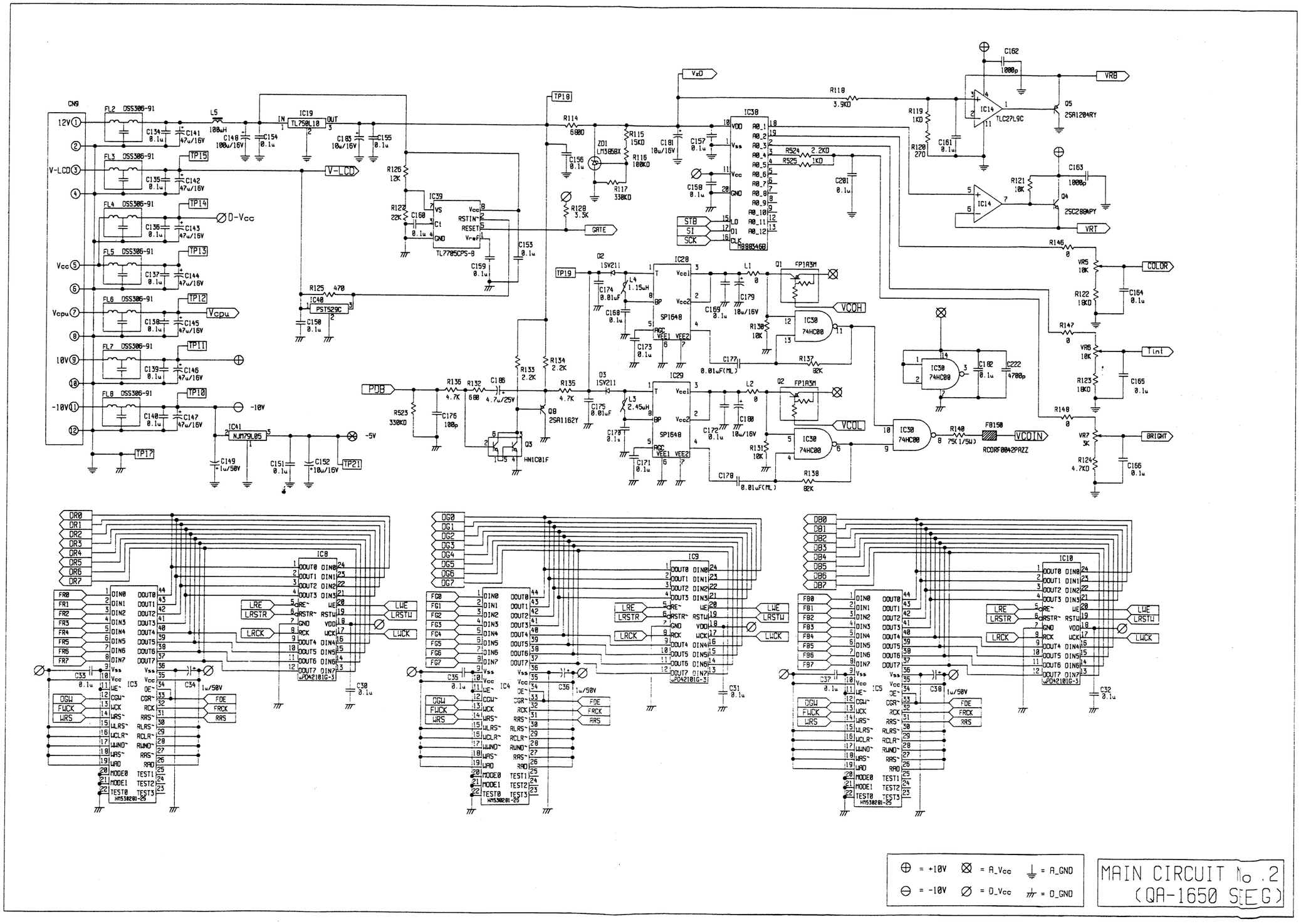


Fig. 43 CIRCUIT DIAGRAM (MAIN-CIRCUIT 2)

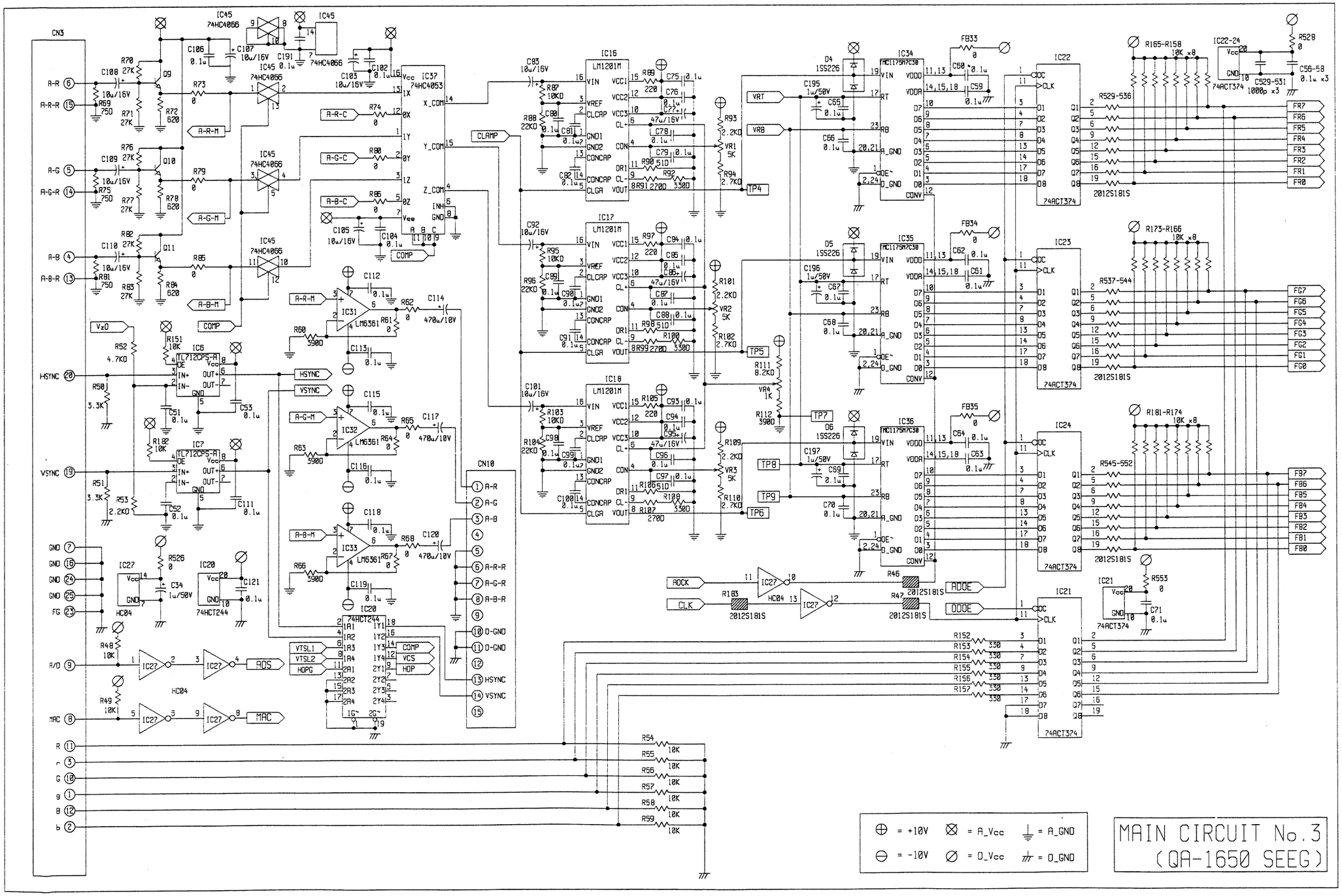


Fig. 44 CIRCUIT DIAGRAM (MAIN-CIRCUIT 3)

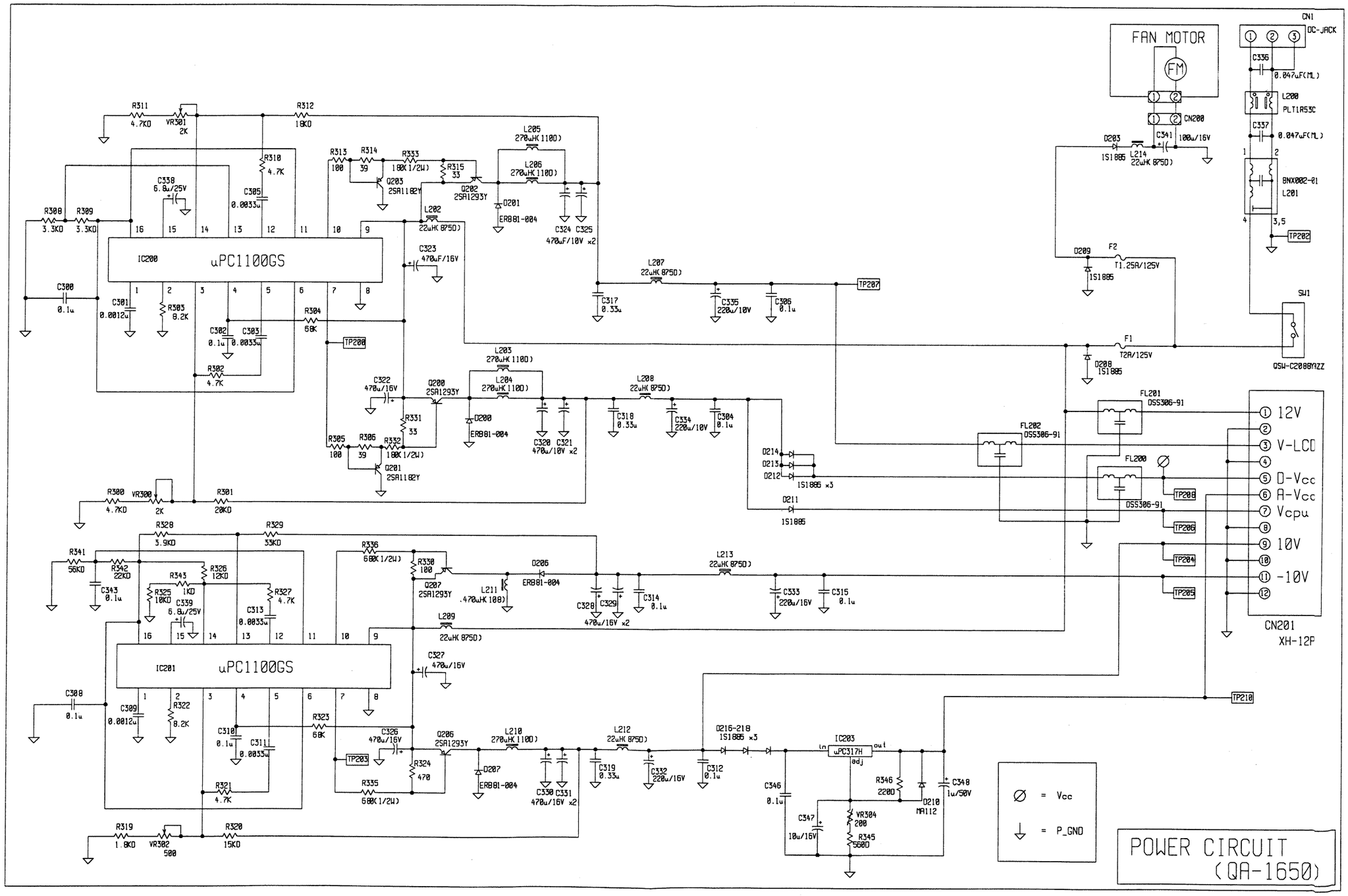


Fig. 45 CIRCUIT DIAGRAM (POWER-CIRCUIT)

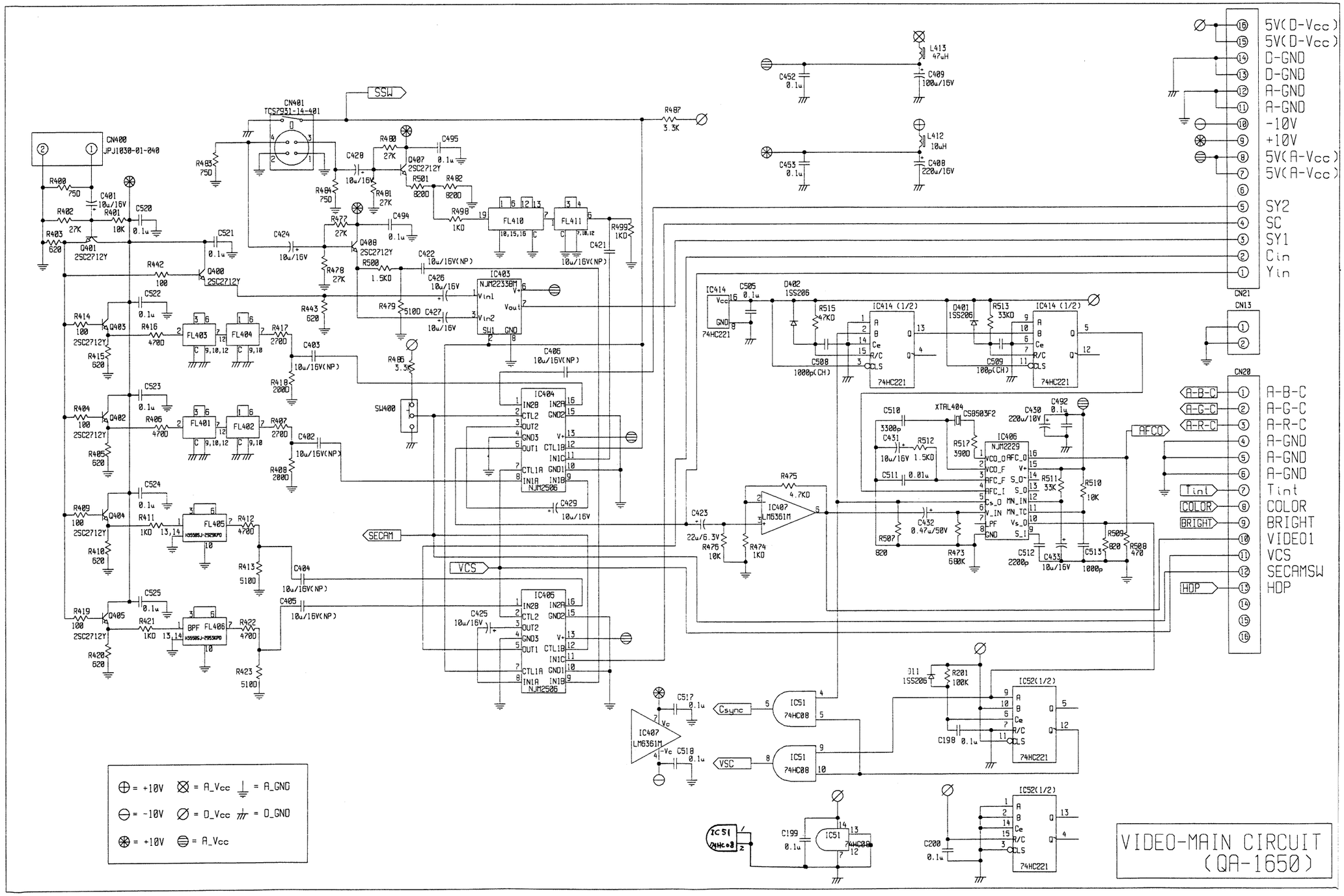


Fig. 46 CIRCUIT DIAGRAM (VIDEO-MAIN CIRCUIT)

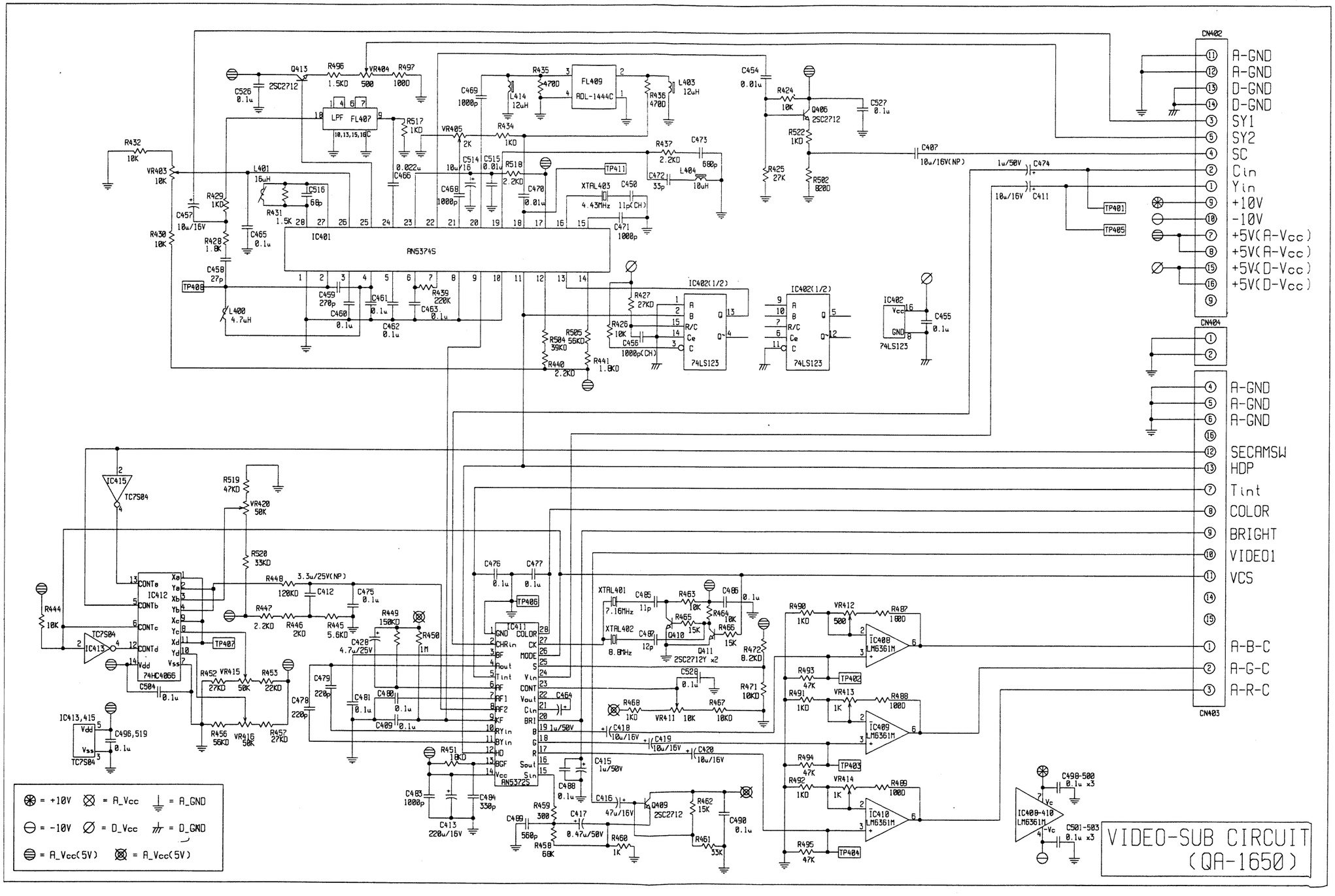


Fig. 47 CIRCUIT DIAGRAM (VIDEO-SUB CIRCUIT)

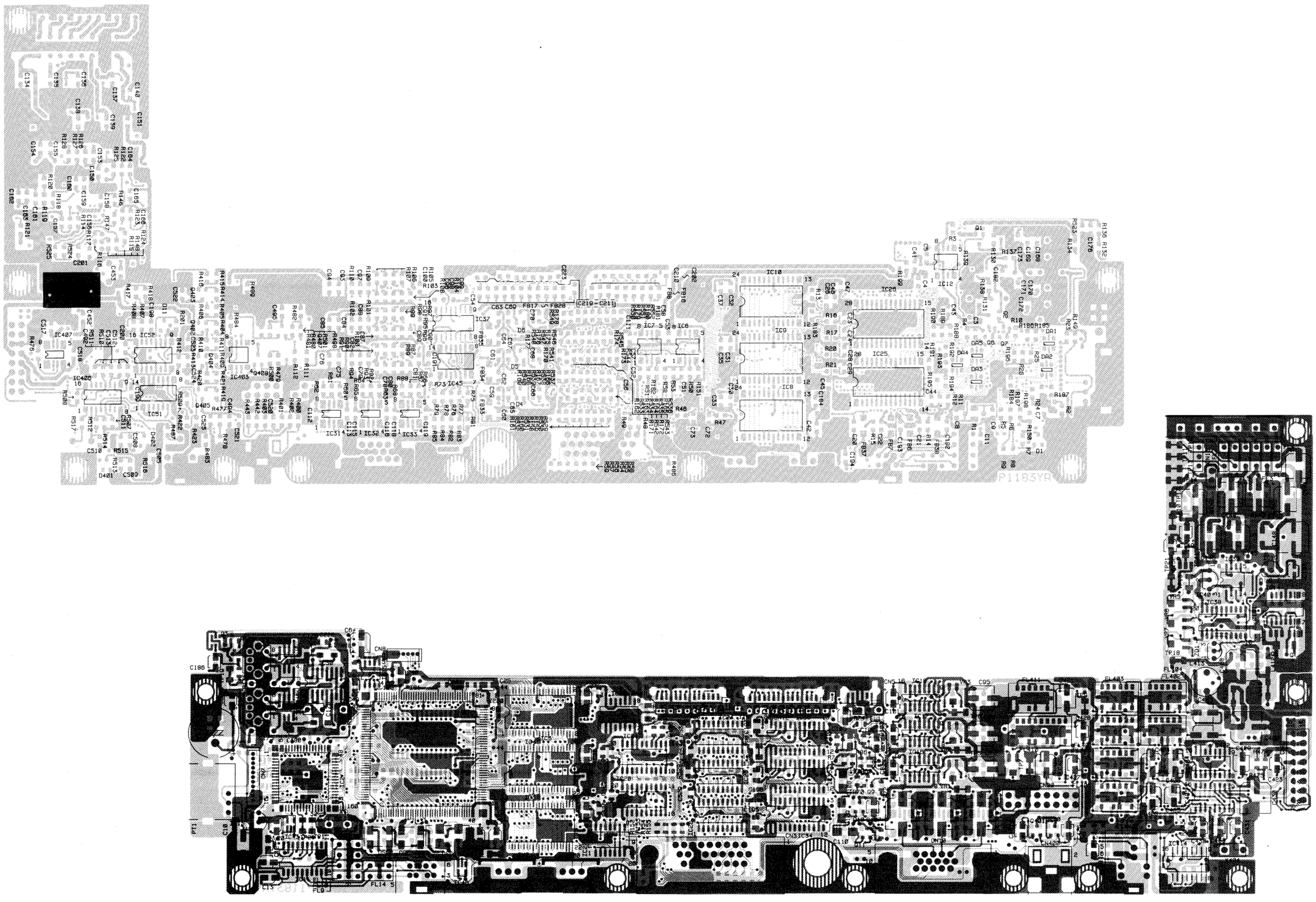
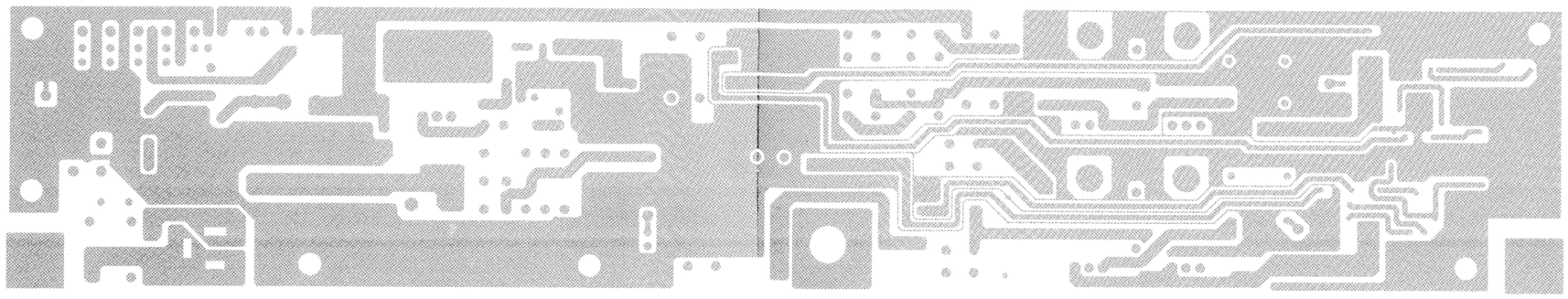


Fig. 48 P.W.B. PATTERN (MAIN P.W.B.)



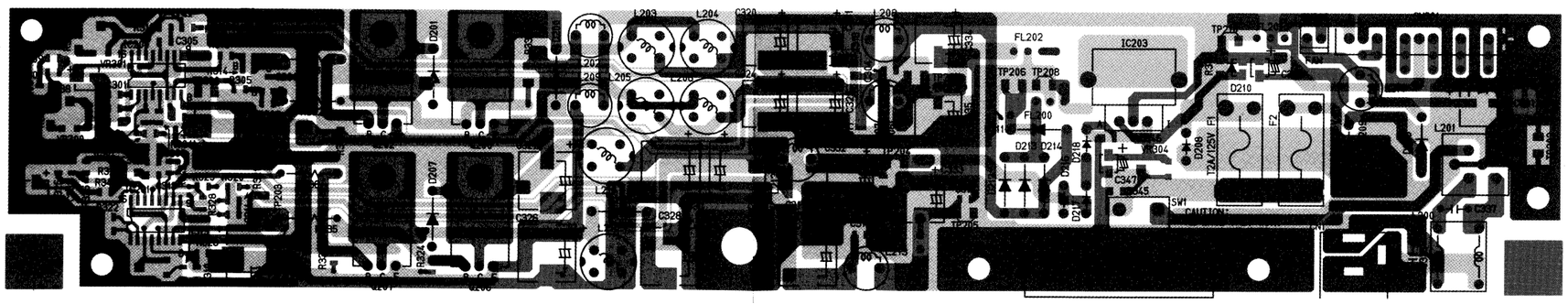


Fig. 49 P.W.B. PATTERN (POWER P.W.B.)

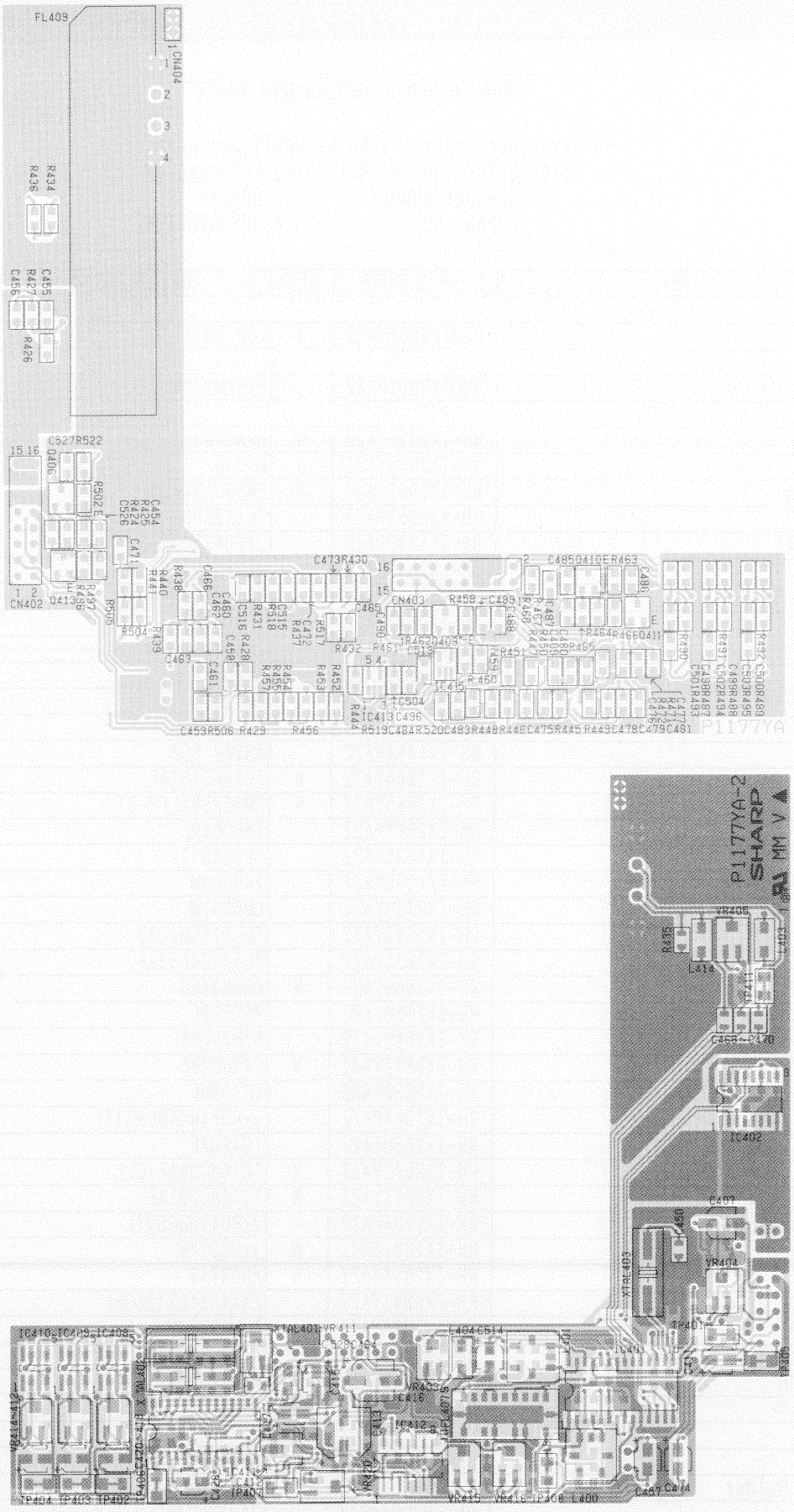


Fig. 50 P.W.B. PATTERN (VIDEO P.W.B.)

REPLACEMENT PARTS LIST

"HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly,
please furnish the following information.
1. MODEL NUMBER 2. REF. NO.
3. PART NO. 4. DESCRIPTION

NO.	REF.	PARTS CODE	NEW	DESCRIPTION	QTY	PRICE
1. LCD						
1-1		DUNTL2089YAZZ	N	LCD UNIT	1	**
2. FAN MOTOR						
2-1		RMOTV0002PAZZ		FAN MOTOR	1	BH
3. IC						
3-1	IC1	RH-IX2858YAZZ	N	L7A1103	1	BH
3-2	IC2	RH-IX2859YAZZ	N	M. P. U.	1	BG
3-3	IC3-5	RH-IX2862YAZZ	N	HM530281-25	3	BL
3-4	IC6, 7	RH-IX0853PAZZ		TL712CPS-A	2	AQ
3-5	IC8-10	RH-IX1230PAZZ		μPD42101G-3	3	AX
3-6	IC11	RH-IX2849YAZZ		MC145407FR2	1	AQ
3-7	IC12, 39	RH-IX0855PAZZ		TL7705CPS-8	2	AL
3-8	IC13	RH-IX0847PAZZ		S-8054ALB	1	AF
3-9	IC14	RH-IX1236PAZZ		TLC27L9C(T)	1	AU
3-10	IC15	RH-IX2830YAZZ		BR9041ARF	1	AR
3-11	IC16-18	RH-IX2818YAZZ		LM1201M	3	AW
3-12	IC19	RH-IX1233PAZZ		TL750L10LP	1	AN
3-13	IC20	RH-IX1464PAZZ		AS244 SOP	1	AP
3-14	IC21-24	RH-IX2864YAZZ	N	TC74ACT374F	4	AL
3-15	IC25, 26	RH-IX2865YAZZ	N	HM62256ALFP-8T	2	AX
3-16	IC27	RH-IX2661YAZZ		74HC04AF	1	AD
3-17	IC28, 29	RH-IX1235PAZZ		SP1648(T)	2	AW
3-18	IC30	RH-IX1239PAZZ		74HC00M	1	AD
3-19	IC31-33, 407-410	RH-IX2799YAZZ		LM6361M	7	AS
3-20	IC34-36	RH-IX2819YAZZ		TMC1175M7C30	1	AY
3-21	IC37	RH-IX2835YAZZ		TC74HC4053AF	1	AE
3-22	IC38	RH-IX2866YAZZ	N	MB88346B	1	AS
3-23	IC40	RH-IX2788YAZZ		PST529C	1	AG
3-24	IC41	RH-IX2846YAZZ		NJM79L05	1	AF
3-25	IC42	RH-IX2872YAZZ	N	74VHC08F	1	AD
3-26	IC43	RH-IX2832YAZZ		TC7S08F	1	AC
3-27	IC45, 412	RH-IX1244PAZZ		μPD74HC4066G(T)	2	AF
3-28	IC46, 413, 415	RH-IX2650YAZZ		TC7S04F	3	AC
3-29	IC51	RH-IX2672YAZZ	N	TC74HC08AF(EL)	1	AD
3-30	IC52, 414	RH-IX2857YAZZ	N	TC74HC221AF	2	AG
3-31	IC200, 201	RH-IX1234PAZZ		μPD1100GS(T)	2	AN
3-32	IC203	RH-IX2861YAZZ	N	μPC317H	1	AH
3-33	IC401	RH-IX2854YAZZ	N	AN5374S	1	AG
3-34	IC402	RH-IX2841YAZZ		AN74LS123(SSOP)	1	AF
3-35	IC403	RH-IX2833YAZZ		NJM2233BM	1	AN
3-36	IC404, 405	RH-IX2855YAZZ	N	NJM2506M	2	AG
3-37	IC406	RH-IX2836YAZZ		NJM2229M	1	AN
3-38	IC411	RH-IX2837YAZZ		AN5372S	1	AQ
4. Module						
4-1	PT1	RRMCU0007PAZZ		GP1U581Y(PHOTE RECEIVER)	1	AK
5. Fuse, Fuse Holder						
5-1	F1	QFS-F0003PAZZ		2A/125V(T)	1	AD
5-2	F2	QFS-B0006PAZZ		1.25A/125V(T)	1	AE
5-3		QFSHA2008YAZZ		FUSE HOLDER(85PE1829)	4	AA

NO.	REF.	PARTS CODE	NEW	DESCRIPTION	QTY	PRICE
6. Connector, Plug						
6-1	CN1	QSOCZ0115PAZZ		DC JACK	1	AD
6-2	CN3	QPLGZ0410PAZZ		D SUB CONNECTOR (26P)	1	AX
6-3	CN4	QPLGJ2705YAZZ	N	CONNECTOR (14P)	1	AF
6-4	CN5	QPLGJ2700YAZZ		CONNECTOR (6P)	1	AD
6-5	CN6	QPLGZ0409PAZZ		SERIAL PORT CONNECTOR (8P)	1	AF
6-6	CN7, 1000	QPLGJ2702YAZZ		CONNECTOR (11P)	2	AD
6-7	CN8	QPLGJ2701YAZZ		CONNECTOR (6P)	1	AC
6-8	CN9	QPLGJ2708YAZZ	N	CONNECTOR (12P)	1	AE
6-9	CN10	QPLGJ2692YAZZ		D SUB CONNECTOR (15P)	1	AW
6-10	CN12	QPLGJ2699YAZZ		CONNECTOR (15P)	1	AF
6-11	CN13	QPLGJ2711YAZZ	N	CONNECTOR (2P)	1	AL
6-12	CN20, 21	QPLGJ2709YAZZ	N	CONNECTOR (16P)	2	AH
6-13	CN200	QPLGZ0253PAZZ		CONNECTOR (2P)	1	AB
6-14	CN201	QPLGJ2690YAZZ		CONNECTOR FOR POWER (12P)	1	AD
6-15	CN400	QSOCZ2031YAZZ		VIDEO PIN JACK	1	AD
6-16	CN401	QSOCZ2032YAZZ	N	S INPUT JACK	1	AH
6-17	CN402, 403	QPLGJ2703YAZZ	N	CONNECTOR (16P)	2	AM
6-18	CN404	QPLGJ2710YAZZ	N	CONNECTOR (2P)	1	AL
7. Switch						
7-1	SW1	QSW-C2088YAZZ		POWER SWITCH	1	AH
7-2	SW2, 400	QSW-S2093YAZZ		RELAY SWITCH	2	AF
8. Transistor						
8-1	Q1, 2	VSFP1A3M///-1		FP1A3M	2	AC
8-2	Q3	VSHN1C01FY/-1		HN1C01F-Y	1	AG
8-3	Q4	VS2SC2884PY-1		2SC2884PY	1	AC
8-4	Q5	VS2SA1204RY-1		2SA1204RY	1	AC
8-5	Q6, 7	VS2SC3913//-1		2SC3913	2	AB
8-6	Q8	VS2SA1162SY-1		2SA1162SY	1	AA
8-7	Q9-11, 400-411, 413	VS2SC2712LY-1		2SC2712LY	16	AA
8-8	Q200, 202, 206, 207	VS2SA1293Y/1E		2SA1293Y	4	AH
8-9	Q201, 203	VS2SA1182-Y-1		2SA1182-Y	2	AB
9. Coil						
9-1	L1, 2, FB33-35, 37, 38	VRS-TQ2BD0000		TQ) 1/8W-0Ω	7	AA
9-2	L3	RCILZ3875PAZZ		7KTLT 2.45μH	1	AE
9-3	L4	RCILZ3874PAZZ		7KTLT 1.15μH	1	AE
9-4	L5	VP-VD101K0000		LEM4532 100μH	1	AC
9-5	L200	RCILZ2110YAZZ		PLT1R53C	1	AH
9-6	L201	RCORF0058PAZZ		BNX-002-01	1	AP
9-7	L202, 207-209, 212-214	RCILZ3877PAZZ		RCR-875D 22μH	7	AF
9-8	L203-206, 210	RCILZ3878PAZZ		RCR-110D 270μH	5	AF
9-9	L211	RCILZ2115YAZZ		RCH-108 470μH	1	AL
9-10	L400	RCILF2129YAZZ	N	614BN-9047Z	1	AE
9-11	L401	RCILF2130YAZZ	N	614BN-9160Z	1	AE
9-12	L403, 414	VP-VD120K0000	N	LEM4532 12μH	2	AC
9-13	L404, 412	VP-VD100K0000	N	LEM4532 10μH	2	AC
9-14	L413	RCILF2116YAZZ		RCH-855 47μH	1	AL
10. Oscillator						
10-1	XTAL1	RCRSZ0043PAZZ		XTAL 7.9872MHz	1	AH
10-2	XTAL401	RCRS-2118YAZZ	N	SMD-49 7.16MHz	1	AG
10-3	XTAL402	RCRS-2119YAZZ	N	SMD-49 8.80MHz	1	AG
10-4	XTAL403	RCRS-2120YAZZ	N	SMD-49 4.43MHz	1	AH
10-5	XTAL404	RCRS-2117YAZZ		CSB503F2	1	AD
10-6	OSC1	RCRS-2113YAZZ		FXO-21F 18.432MHz	1	AQ
10-7	OSC2	RCRS-2123YAZZ	N	DSO751S 25.175MHz	1	AT
10-8	OSC3	RCRS-2124YAZZ	N	DSO751S 21.000MHz	1	AT

NO.	REF.	PARTS CODE	NEW	DESCRIPTION	QTY	PRICE
11. Diode						
11-1	ZD1	VHELM385BX/-1		LM385BXZ	1	AV
11-2	D1	VHD1SS294//-1		1SS294	1	AB
11-3	D2, 3	VHD1SV211//-1		1SV211	2	AC
11-4	D4-6, 11, 401, 402	VHD1SS226//-1		1SS226	6	AB
11-5	D10, 210	VHDMA112///-1		MA112	1	AB
11-6	D200, 201, 207	VHDERB81-004/		ERB81-004	3	AF
11-7	D203, 208, 209, 211-214, 216-218	VHD1S1885//-1		1S1885	10	AC
11-8	DA1-5	VHDHN2D01F/-1		HN2D01F	5	AC
11-9	LED1	RH-PX2157YAZZ	N	LED	1	AB
12. Filter						
12-1	FL1-4, 200, 201, 202	RFILN0004PAZZ		DSS306-91	17	AC
12-2	FL10	RMPT-2062YAZZ	N	ACF321825-470	1	AE
12-3	FL401	RCILF2120YAZZ	N	H355LDK-6454	1	AK
12-4	FL402	RCILF2121YAZZ	N	G355ENK-6455	1	AK
12-5	FL403	RCILF2122YAZZ	N	H355LDK-6459	1	AK
12-6	FL404	RCILF2123YAZZ	N	G355ENK-6460	1	AK
12-7	FL405	RCILF2124YAZZ	N	H355BSK-2929KPD	1	AK
12-8	FL406	RCILF2125YAZZ	N	H355BSJ-2953KPD	1	AK
12-9	FL407	RCILF2126YAZZ	N	H356LSL-4544TRD	1	AM
12-10	FL409	RCILZ0667CEZZ	N	ALD-1444C	1	AQ
12-11	FL410	RCILF2127YAZZ	N	G356ENM-4427TCD	1	AM
12-13	FL411	RCILF2128YAZZ	N	H355LSK-4410LCD	1	AK
13. Core						
13-1	FB6, 7	RCORF2011YAZZ		BLM41A04	2	AE
13-2	FB8-27, R16, 17, 20, 21	RCORF2010YAZZ		BLM21A05	24	AE
13-3	FB150	RCORF0042PAZZ		FERRITE BEAD	1	AA
14. VR						
14-1	VR1-3	RVR-M0216PAZZ		ST-4A 5K	3	AG
14-2	VR4, 413, 414	RVR-M2285YAZZ		ST-4TA 1K	3	AG
14-3	VR5, 6, 403, 411	RVR-M2283YAZZ		ST-4TA 10K	4	AG
14-4	VR7	RVR-M2292YAZZ	N	ST-4A 3K	1	AG
14-5	VR300, 301	RVR-M2276YAZZ		RVG4M08 2K	2	AF
14-6	VR302	RVR-M2255YAZZ		VR 500Ω	1	AF
14-7	VR304	RVR-M2236YAZZ		RVG 4M0I 200Ω	1	AF
14-8	VR404, 412	RVR-M2288YAZZ		ST-4TA 500Ω	2	AG
14-9	VR405	RVR-M2291YAZZ		ST-4TA 2K	1	AG
14-10	VR415, 416, 420	RVR-M2284YAZZ		ST-4TA 50K	3	AG
15. Resister						
15-1	R1	VRS-TQ2BD106J		TQ) 1/8W-10MJ	1	AA
15-2	R2-4, 6, 135, 136, 302, 310, 321, 327	VRS-TW2AD472J		TW) 1/10W-4.7KJ	10	AA
15-3	R5, 7-12, 24-26, 48, 49, 54-59, 121, 130, 131, 150, 151, 158-182, 184-199, 401, 424, 426, 430, 432, 444, 463, 464, 476, 510	VRS-TW2AD103J		TW) 1/10W-10KJ	74	AA
15-4	R13, 46, 47, 183, 529-552	RCORF2023YAZZ	N	MMZ2012S181A	28	AB
15-5	R14, 15, 22	RCORF2022YAZZ	N	MMZ2012S301A	3	AB
15-6	R23, 132	VRS-TW2AD681J		TW) 1/10W-680J	2	AA
15-7	R50, 51, 128, 486, 487	VRS-TW2AD332J		TW) 1/10W-3.3KJ	5	AA
15-8	R52, 124, 300, 311, 475, 513	VRN-TV2AQ472D		TV) 1/10W-4.7KD	6	AA
15-9	R53, 93, 101, 109, 437, 440, 447, 518, 524	VRN-TV2AQ222D		TV) 1/10W-2.2KD	9	AA
15-10	R60, 63, 66, 112, 517	VRN-TV2AQ391D		TV) 1/10W-390D	5	AA
15-11	R61, 62, 64, 65, 67, 68, 73, 74, 79, 80, 85, 86, 146-148, 526-528, 553, FB28	VRS-TW2AD0000		TW) 1/10W-0Ω	10	AA
15-12	R69, 75, 81, 400, 483, 484	VRN-TV2AS750D		TV) 1/10W-75D	6	AA
15-13	R70, 71, 76, 77, 82, 83, 402, 425, 477	VRS-TW2AD273J		TW) 1/10W-27KJ	12	AA

NO.	REF.	PARTS CODE	NEW	DESCRIPTION	QTY	PRICE
	,478,480,481					
15-14	R72,78,84,403,405,410,415,420 ,443	VRS-TW2AD621J		TW) 1/10W-620J	9	AA
15-15	R87,95,103,325,467,471	VRN-TV2AQ103D		TV) 1/10W-10KD	6	AA
15-16	R88,96,104,453	VRN-TV2AQ223D		TV) 1/10W-22KD	4	AA
15-17	R89,97,105	VRS-TW2AD221J		TW) 1/10W-220J	3	AA
15-18	R90,98,106	VRN-TV2AS510D		TV) 1/10W-51D	3	AA
15-19	R91,99,107	VRN-TV2AQ271D		TV) 1/10W-270D	5	AA
15-20	R92,100,108	VRN-TV2AQ331D		TV) 1/10W-330D	3	AA
15-21	R94,102,110	VRN-TV2AQ272D		TV) 1/10W-2.7KD	3	AA
15-22	R111,472	VRN-TV2AQ822D		TV) 1/10W-8.2KD	2	AA
15-23	R114	VRN-TV2AQ681D		TV) 1/10W-680D	1	AA
15-24	R115,320	VRN-TV2AQ153D		TV) 1/10W-15KD	2	AA
15-25	R116,201	VRN-TV2AQ104D		TV) 1/10W-100KD	2	AA
15-26	R117,523	VRN-TV2AR334D		TV) 1/10W-330KD	2	AA
15-27	R118,328	VRN-TV2AQ392D		TV) 1/10W-3.9KD	2	AA
15-28	R119,343,411,421,429,434,468 ,474,489-492,522,525	VRN-TV2AQ102D		TV) 1/10W-1KD	16	AA
15-29	R120	VRN-TV2AS270D		TV) 1/10W-27D	1	AA
15-30	R122,123,312,451	VRN-TV2AQ183D		TV) 1/10W-18KD	4	AA
15-31	R125,324,508	VRS-TW2AD471J		TW) 1/10W-470J	3	AA
15-32	R126	VRS-TW2AD123J		TW) 1/10W-12KJ	1	AA
15-33	R127	VRS-TW2AD223J		TW) 1/10W-22KJ	1	AA
15-34	R133,134	VRS-TW2AD222J		TW) 1/10W-2.2KJ	2	AA
15-35	R137,138	VRS-TW2AD823J		TW) 1/10W-82KJ	2	AA
15-36	R140	VRD-ST2DF750J		ST) 1/5W-75J	1	AA
15-37	R149	VRS-TW2AD470J		TW) 1/10W-47J	1	AA
15-38	R152-157	VRS-TW2AD331J		TW) 1/10W-330J	6	AA
15-39	R303,322	VRS-TW2AD822J		TW) 1/10W-8.2KJ	2	AA
15-40	R304,323,458	VRS-TW2AD683J		TW) 1/10W-68KJ	3	AA
15-41	R305,313,330,404,409,414,419 ,442	VRS-TW2AD101J		TW) 1/10W-100J	8	AA
15-42	R306,314	VRS-TW2AD390J		TW) 1/10W-39J	2	AA
15-43	R308,309	VRN-TV2AQ332D		TV) 1/10W-3.3KD	2	AA
15-44	R315	VRS-TW2AD330J		TW) 1/10W-33J	1	AA
15-45	R319,441	VRN-TV2AQ182D		TV) 1/10W-1.8KD	2	AA
15-46	R326	VRN-TV2AQ122D		TV) 1/10W-1.2KD	1	AA
15-47	R329,513,520	VRN-TV2AQ333D		TV) 1/10W-33KD	3	AA
15-48	R331	VRS-TQ2BD330J		TQ) 1/8W-33J	1	AA
15-49	R332,333	VRD-ST2HA181J		ST) 1/2W-180J	2	AA
15-50	R335,336	VRD-ST2HA681J		ST) 1/2W-680J	2	AA
15-51	R341,456,505	VRN-TV2AQ563D		TV) 1/10W-56KD	3	AA
15-52	R342	VRN-TV2AQ223D		TV) 1/10W-22KD	1	AA
15-53	R345	VRN-TV2AQ561D		TV) 1/10W-560D	1	AA
15-54	R346	VRN-TV2AQ221D		TV) 1/10W-220D	1	AA
15-55	R406,412,416,422,435,436	VRN-TV2AQ471D		TV) 1/10W-470D	6	AA
15-56	R408,418	VRN-TV2AQ201D		TV) 1/10W-200D	2	AA
15-57	R413,423,479	VRN-TV2AQ511D		TV) 1/10W-510D	3	AA
15-58	R427,452,457	VRN-TV2AQ273D		TV) 1/10W-27KD	3	AA
15-59	R428	VRS-TW2AD182J		TW) 1/10W-1.8KJ	1	AA
15-60	R431,496,500,512	VRN-TV2AQ152D		TV) 1/10W-1.5KD	4	AA
15-61	R439	VRS-TW2AD224J		TW) 1/10W-220KJ	1	AA
15-62	R445	VRN-TV2AQ562D		TV) 1/10W-5.6KD	1	AA
15-63	R446	VRN-TV2AQ202D		TV) 1/10W-2KD	2	AA
15-64	R448	VRN-TV2AR124D		TV) 1/10W-120KD	1	AA
15-65	R449	VRN-TV2AR154D		TV) 1/10W-150KD	1	AA
15-66	R450	VRS-TW2AD105J		TW) 1/10W-1MJ	1	AA

NO.	REF.	PARTS CODE	NEW	DESCRIPTION	QTY	PRICE
15-67	R504	VRN-TV2AQ393D		TV) 1/10W-39KD	1	AA
15-68	R459	VRS-TW2AD301J		TW) 1/10W-300J	1	AA
15-69	R460	VRS-TW2AD102J		TW) 1/10W-1KJ	1	AA
15-70	R461, 511	VRS-TW2AD333J		TW) 1/10W-33KJ	2	AA
15-71	R462, 465, 466	VRS-TW2AD153J		TW) 1/10W-15KJ	3	AA
15-72	R473	VRS-TW2AD684J		TW) 1/10W-680KJ	1	AA
15-73	R482, 501, 502	VRN-TV2AQ821D		TV) 1/10W-820D	3	AA
15-74	R487	VRN-TV2AQ181D		TV) 1/10W-180D	1	AA
15-75	R488, 489, 497	VRN-TV2AQ101D		TV) 1/10W-100D	3	AA
15-76	R493-495	VRS-TW2AD473J		TW) 1/10W-47KJ	3	AA
15-77	R507, 509	VRS-TW2AD821J		TW) 1/10W-820J	2	AA
15-78	R515, 519	VRN-TV2AQ473D		TV) 1/10W-47KD	2	AA
16. Capacitor						
16-1	C1	RC-EZ2590YAZZ		0.047F/6.3V	1	AH
16-2	C2, 12-15, 48, 49, 55, 83, 92, 103, 105, 107, 179, 180, 181, 183, 188, 347, 418-420, 424, 426-428, 431, 433, 457, 514	VCEAPH1CC106M		10μF/16V	30	AC
16-3	C3-5, 7, 11, 16, 20, 26, 30-33, 35, 37, 41-47, 51-54, 56-71, 75, 76, 78-82, 84, 85, 87-91, 93, 94, 96-100, 102, 104, 106, 111-113, 115, 116, 118, 119, 121, 134-140, 150, 151, 153-160, 164-166, 168-173, 182, 184, 191, 194, 198-201, 300, 302, 304, 306, 308, 310, 312, 314, 315, 343, 346, 409, 452, 453, 455, 460-463, 465, 475-477, 480, 481, 486, 488, 492, 494-496, 498-505, 519-528	VCKYTV1EF104Z		0.1μF/25V	153	AA
16-4	C6	VCEAPS1AC226M		22μF/10V	1	AC
16-5	C8, 9	VCCCTV1H3180J		18pF/50V	2	AA
16-6	C10, 77, 86, 95, 101, 141-147, 416	VCEAPS1CC476M	N	47μF/16V	13	AC
16-7	C19, 25, 34, 36, 38, 149, 152, 185, 186, 348, 415, 467	VCEAPH1HC105M		1μF/50V	12	AC
16-8	C108-110	RC-SZ2617YAZZ		10μF/16V	3	AC
16-9	C114, 117, 120, 320, 321, 324, 325	VCEAPZ1AC477M		470μF/10V	7	AD
16-10	C148, 341, 409	VCEAPZ1CC107M		100μF/16V	3	AC
16-11	C162, 163, 456, 468, 469, 471, 483, 529-531	VCKYTV1HB102K		0.001μF/50V	10	AA
16-12	C174, 175, 192, 193, 454, 470, 511, 515	VCKYTV1HB103K		0.01μF/50V	8	AB
16-13	C176, 223, 509	VCCCTV1H3101J		100pF/50V	3	AA
16-14	C177, 178	RC-QZS103AFYK		0.01μF/50V	2	AB
16-15	C195-197	VCKYTQ1CF105Z		1μF/16V	3	AB
16-16	C202-219	VCCCTV1H3470J		47pF/50V	18	AA
16-17	C220-222	VCKYTV1HB472K		0.0047μF/50V	3	AA
16-18	C301, 309	VCKYTV1HB122K		0.0012μF/50V	2	AA
16-19	C303, 305, 311, 313, 510	VCKYTV1HB332K		0.0033μF/50V	5	AA
16-20	C317-319	VCKYTQ1EF334Z		0.33μF/25V	3	AB
16-21	C322, 323, 326-331	VCEAPZ1CC477M		470μF/16V	8	AC
16-22	C332, 333, 408	VCEAPZ1CC227M		220μF/16V	3	AC
16-23	C334, 335, 413, 430	VCEAPZ1AC227M		220μF/10V	4	AC
16-24	C336, 337	RC-QZS473AFYK		0.047μF/50V	2	AF
16-25	C338, 339	VCEAPL1EN685M		6.8μF/25V	2	AD
16-26	C407, 401-406, 422	VCEAPF1CC106M	N	10μF/16V	8	AC
16-27	C411, 425, 429	VCEAPF1AC106M		10μF/10V	3	AC

NO.	REF.	PARTS CODE	NEW	DESCRIPTION	QTY	PRICE
16-28	C412	VCEAPF1EC335M		3.3μF/25V	1	AC
16-29	C417, 432	VCEAPH1HC474M	N	0.47μF/50V	2	AC
16-30	C423	VCEAPH0JC226M		22μF/6.3V	1	AC
16-31	C428	VCEAPH1EC475M		4.7μF/25V	1	AC
16-32	C450, 485	VCCCTV1H110J		11pF/50V	2	AA
16-33	C458	VCCCTV1H270J		27pF/50V	1	AA
16-34	C459	VCCCTV1H271J		33pF/50V	1	AA
16-35	C466	VCKYTV1HB223K		0.022μF/50V	1	AA
16-36	C472	VCCCTV1H330J		33pF/50V	1	AA
16-37	C473	VCCCTV1H681J		680pF/50V	1	AB
16-38	C474	VCEAPF1HC105M		1μF/50V	1	AC
16-39	C478, 479	VCCCTV1H221J		220pF/50V	2	AA
16-40	C484	VCCCTV1H331J		330pF/50V	1	AA
16-41	C487	VCCCTV1H120J		12pF/50V	1	AA
16-42	C489	VCCCTV1H561J		560pF/50V	1	AA
16-43	C508, 513	VCCCTV1H102J		1000pF/50V	2	AA
16-44	C512	VCKYTV1HB222K		0.0022μF/50V	1	AA
16-45	C516	VCCCTV1H680J		68pF/50V	1	AA
16-46	C600-603	VCKYBT1CX472M		0.0047μF/16V	4	AA
17. CABINET PARTS						
17-1	1	GCABA2026YASA	N	CABINET A	1	BN
17-2	2	DCABB2027YASA	N	CABINET B ASSEMBLY	1	BG
17-3	3	GWAKP2006YASA	N	OPERATION FRAME A	1	AG
17-4	4	GWAKP2007YASA	N	OPERATION FRAME B	1	AF
17-5	5	LFRM-2004YASA	N	ALUMINIUM FRAME	1	AU
17-6	6	QCNCM2544YAZZ	N	CABLE FOR POWER P.W.B.	1	AN
17-7	7	QCNCM2545YAZZ	N	CABLE FOR SWITCH P.W.B.	1	AQ
17-8	8	QCNCM2553YAZZ	N	LCD CABLE 1	1	AU
17-9	9	QCNCM2554YAZZ	N	LCD CABLE 2(FOR 12V)	1	AQ
17-10	10	QCNCM2555YAZZ	N	LCD CABLE 3	1	AU
17-11	11	PFILW2004YAZZ		RECEIVER COVER	1	AE
17-12	12	DCOV-2024YASA	N	FAN COVER ASSEMBLY	1	BC
17-13	13	PGLSN2007YASA	N	GLASS A	1	AV
17-14	14	PGLSN2008YASA	N	GLASS B	1	BB
17-15	15	LANGK2037YASA	N	ANGLE A	1	AH
17-16	16	LANGK2038YASA	N	ANGLE B	1	AH
17-17	17	LANGK2039YASA	N	ANGLE FOR LCD	1	AT
17-18	18	PSHEG2100YAZZ	N	INSULATION SHEET A	1	AH
17-19	19	PSHEG2097YAZZ	N	INSURATION SHEET B	1	AK
17-20	20	MSPRP2003YASA	N	RUBBER KEY	1	AH
17-21	21	PCUS-2034YAZZ		FOOT RUBBER	4	AB
17-22	22	PCUS-2036YAZZ		CUSHION A	6	AA
17-23	23	PCUS-2037YAZZ		CUSHION B	6	AA
17-24	24	RCORF2013YAZZ		CRAMP CORE(ZCAT 2035)	2	AF
17-25	25	TLABZ2113YAZZ	N	TFT LABEL	1	AK
17-26	26	XYBSD30P08000		SCREW 3B+8S	15	AA
17-27	27	XQBSF30P08000		SCREW 3B+8S	4	AA
17-28	28	XBPSC30P06000		SCREW M3×6	8	AA
17-29	29	XYBSD30P08000		SCREW 3B+8S	2	AA
17-30	30	XYBSF30P12000		SCREW 3B+12S	7	AA
17-31	31	XBSSC30P06000		SCREW M3×6	2	AA
17-32	32	XQBSF30P08000		SCREW 3B+8S	2	AA
17-33		PCUS-2048YAZZ	N	SPONGE(1)	1	AE
17-34		PCUS-2050YAZZ	N	CUSHION	12	AE
17-35		PCUS-2044YAZZ		CUSHION	5	AA
17-36		PCUS-2055YAZZ	N	CUSHION FOR FOOT RUBBER	4	AA
17-37		LHLDW2015YAZZ	N	WIRE CRAMP	2	AC

NO.	REF.	PARTS CODE	NEW	DESCRIPTION	QTY	PRICE
17-38		PSHEG2102YAZZ	N	INSULATION SHEET	1	AK
17-39		RCORF2017YAZZ		ZCAT1312	1	AM
17-40		PSHEG2099YAZZ		SHIELD TAPE	2	AF
17-41		PSHEG2095YAZZ		SHIELD TAPE	3	AG
17-42		PSHEG2101YAZZ	N	SHIELD TAPE	1	AP
18. OTHERS						
18-1		RRMCG2007YAZZ	N	REMOTE CONTROL UNIT	1	BQ
18-2		DSOCZ2015YAZZ		15P RGB CABLE (SEC, SECL)	1	BL
18-3		DSOCZ2020YAZZ		15P RGB CABLE (SEEG)	1	BL
18-4		DSOCZ2016YAZZ		CABLE FOR MAC	1	BN
18-5		DSOCZ2023YAZZ	N	LOOP THROUGH CABLE	1	BM
18-6		DADP-2004YAZZ	N	AC ADAPTOR	1	BU
18-7		DACCV2002YAZZ		AC CORD (SUK)	1	BA
18-8		QACCV2003YAZZ		AC CORD (SCA)	1	AX
18-9		DACCV2005YAZZ	N	AC CORD (SEEG)	1	AZ
18-10		TLABZ2111YAZZ	N	AC ADAPTOR CAUTION LABEL	1	AB
18-11		TINSE2050YAZZ	N	OPERATION MANUAL (SEC)	1	AQ
18-12		TINES2052YAZZ	N	OPERATION MANUAL<E> (SECL)	1	AV
18-13		TINSF2053YAZZ	N	OPERATION MANUAL<F> (SECL)	1	AV
18-14		TINSE2062YAZZ	N	OPERATION MANUAL (SCA)	1	AV
18-15		TINSE2063YAZZ	N	OPERATION MANUAL (SUK)	1	AV
18-16		TINSL2058YAZZ	N	OPERATION MANUAL (SEEG)	1	BH
18-17		TGANJ2008YAZZ	N	WARRANTY CARD<E> (SECL)	1	AC
18-18		TGANJ2009YAZZ	N	WARRANTY CARD<F> (SECL)	1	AC
18-19		TLABS2114YAZZ	N	DBP NUMBER LABEL (SEEG)	1	AC
19. P. W. B. ASSEMBLY						
19-1		DPWB-2085YAZZ	N	MAIN P. W. B. ASSEMBLY	1	**
19-2		DPWB-2080YAZZ	N	POWER P. W. B. ASSEMBLY	1	CB
19-3		DPWB-2081YAZZ	N	VIDEO P. W. B. ASSEMBLY	1	BX
19-4		DPWB-2088YAZZ	N	SWITCH P. W. B. ASSEMBLY	1	BG

ASSEMBLY DRAWINGS

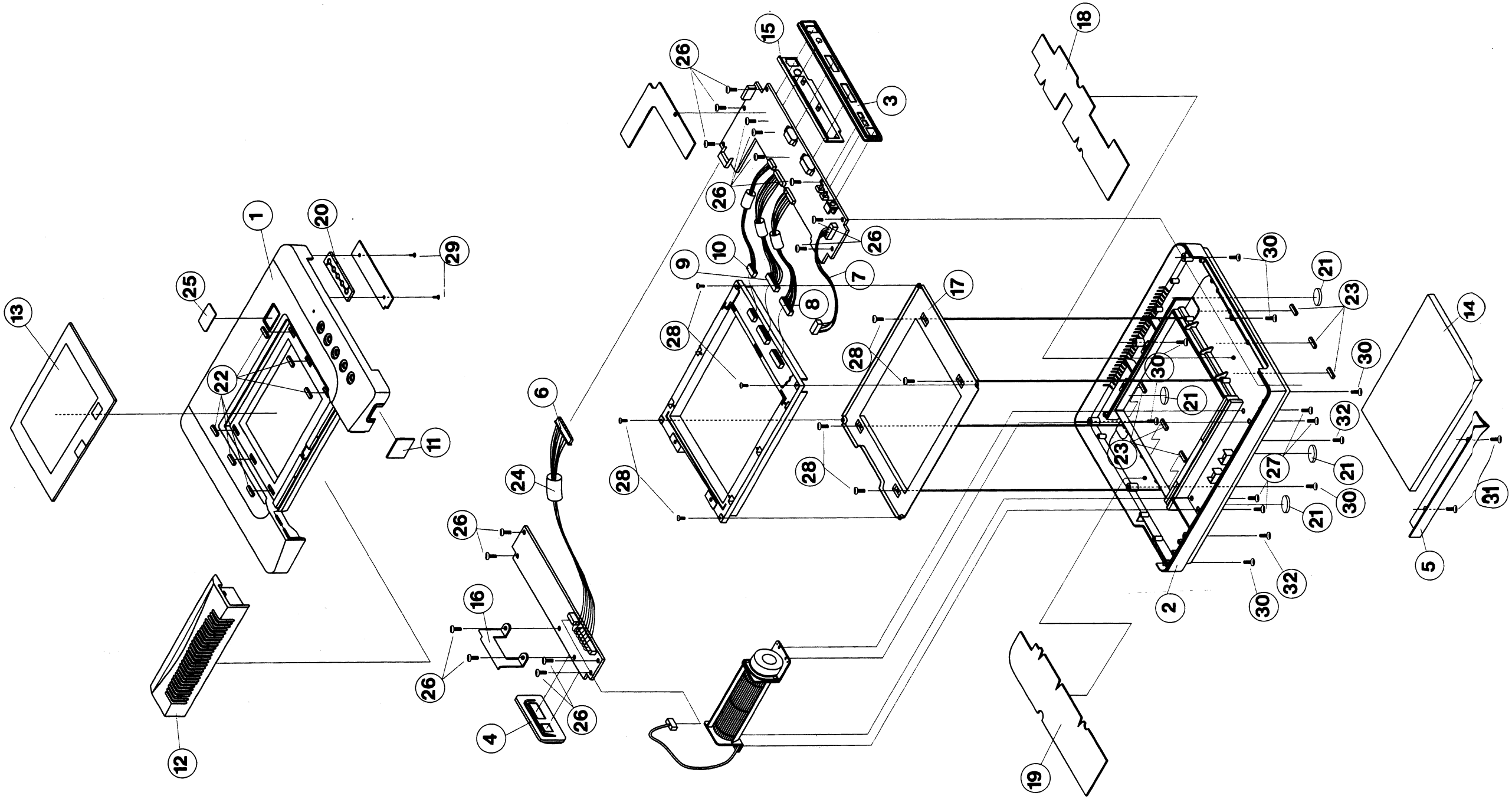


Fig. 51 CABINET PARTS

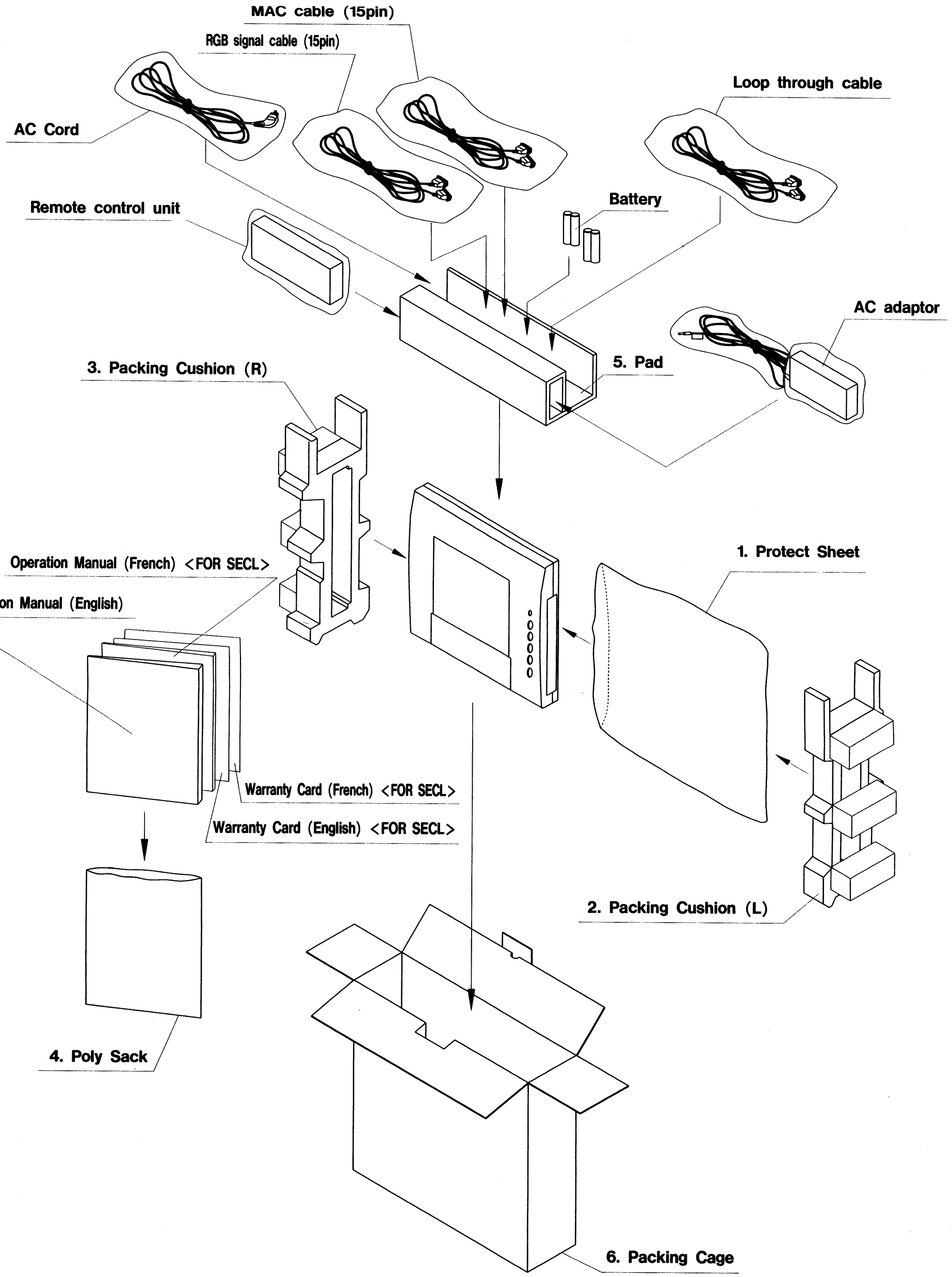
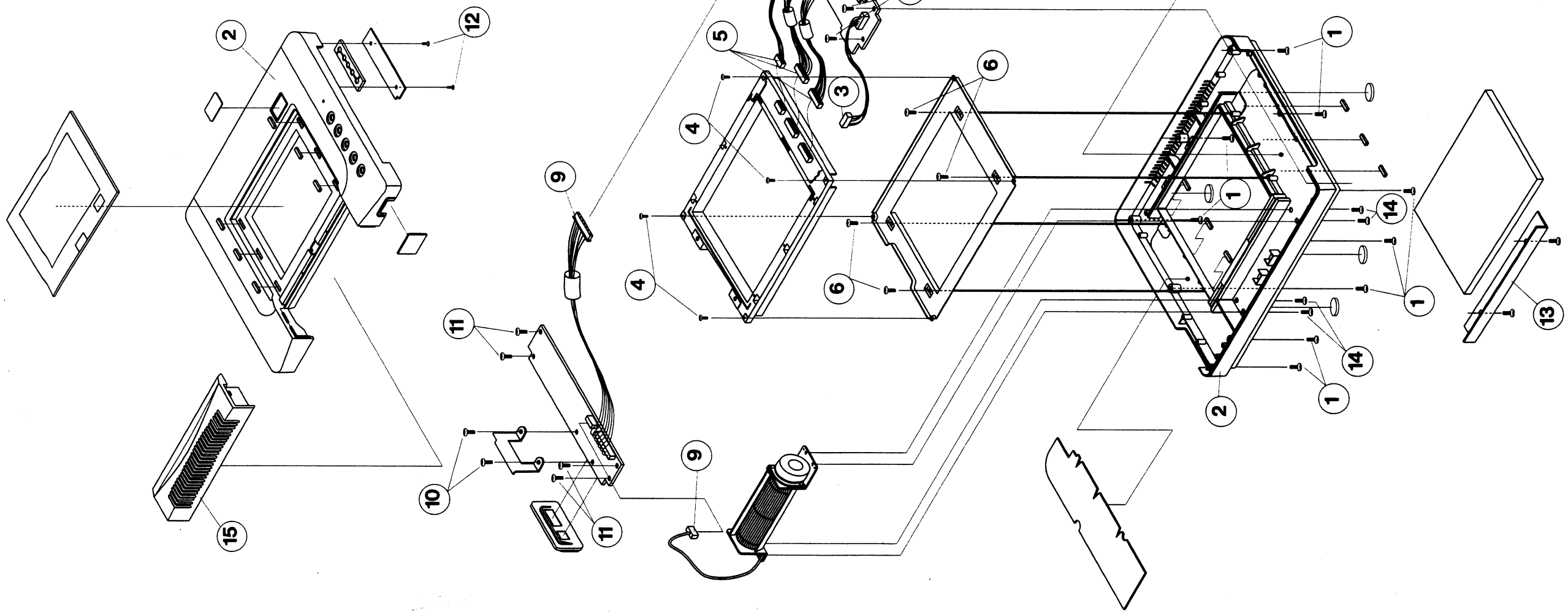


Fig. 52 PACKING OF THE SET



(1) Remove nine screws ① holding the bottom cabinet.
(2) Separate the top and bottom cabinet ②
(3) Remove the cable ③ from the connector.
(4) Remove four screws ④ holding the LCD unit.
(5) Remove three cables ④ from the connector.
(6) Remove four screws ⑥ holding the angle.
(7) Separate the VIDEO P.W.B. ⑦ from the MAIN P.W.B.
(8) Remove nine screws ⑧ holding the MAIN P.W.B.
(9) Remove two cables ⑨ from the connector.
(10) Remove two screws ⑩ holding the angle.
(11) Remove four screws ⑪ holding the POWER P.W.B.
(12) Remove two screws ⑫ holding the SWITCH P.W.B.
(13) Remove two screws ⑬ holding the aluminium frame.
(14) Remove four screws ⑭ holding the fan motor.
(15) Separate the fan cover assembly ⑮.

Fig. 53 DISASSEMBLY AND REASSEMBLY